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ABSTRACT

Designed to provide a model curriculum and guidelines, this manual presents tasks that were identified by employers, employees, and teachers as important in a postsecondary auto body repair curriculum. The tasks are divided into ten major component areas of instruction: metalworking and fiberglass, painting, frame and suspension, glass and trim, estimating, electrical, cooling systems, accessories, servicing, and welding. For each task statement, the task analysis identifies the competency required, the criterion of satisfactory performance, the skills or process the employee must have or follow in performing the task, the knowledge or theory one must know to perform the task effectively, and attitudes and values needed to be successful in carrying out the task. Following the task analyses, a curriculum model provides a curriculum description, courses by quarters, and course descriptions with the suggested tasks to be taught in each course. (The task inventory is appended.) (LRA)

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AUTOMOTIVE BODY REPAIR

COMPETENCIES

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DEPARTMENT OF COMMUNITY COLLEGES
OCCUPATIONAL PROGRAM SERVICES
RALEIGH, NORTH CAROLINA

CE 027 989

FOREWORD

The Department of Community Colleges and the State Board of Education encourage the institutions in the System to maintain high-quality educational standards to assure that those who avail themselves of the educational opportunities offered in the System are prepared to meet the requirements of the jobs for which they train. To assure high-quality educational programs the State Board has instructed the Department to assist the institutions in the development of the competencies for each educational curriculum.

This document presents the job opportunities and competencies identified as those appropriate to the auto body repair curriculum offered in the Community College System. The materials included are the results of the involvement of employers, employees, and educators and of many long, tedious hours of "homework" and committee work of instructors from the System.

This material is to be considered as a minimum standard. The material should provide guidance as a model to assist the curriculum planners in the institution in the development of the curriculum. Each institution offering a auto body repair curriculum is encouraged to organize and involve an advisory committee composed of employers and employees in the automobile world of work in the adaptation of these materials to the area being served.

PREFACE

In 1976 the Program Development Section, Department of Community Colleges, designed a competency-based curriculum development project using the task analysis technique as a proposal for the development of technical and vocational curriculums offered in the Community College System. This project was designed to involve employers, employees, and educators through use of surveys, curriculum committees, and advisory committees in determining the jobs and competencies in the auto body repair occupations.

These materials are primarily the work of the curriculum committee composed of auto body repair instructors in the Community College System. This committee was appointed by the Program Development Section. The members were selected from persons nominated by the presidents and deans of institutions offering the auto body repair curriculum in the System.

The committee proceeded as set forth in the project to: develop a list of jobs in which graduates of the curriculum may find employment; develop a survey to include all the tasks automobile body mechanics perform on the jobs; conduct and analyze the survey; write competencies and criterion measures for each of the tasks; analyze the tasks for skills, knowledge, and values to be taught; relate competencies to job titles; and develop a model curriculum with curriculum guidelines.

The intent of this manual is to provide a model curriculum and guidelines based on input from employers, employees, and educators. Each institution should involve an advisory committee in adapting these materials to a curriculum that will prepare individuals to perform the competencies and criterion levels identified. These competencies are to be considered as minimum for each curriculum offered in the System. The institutions are encouraged to examine local needs and adapt the curriculum to include those local needs.

It is recommended that consideration be given to implementing the ideas and curriculum model presented herein as it is based upon the experience, insight, advice, and work of instructors in the System.

ACKNOWLEDGMENTS

The Curriculum Committee

The Curriculum Committee was composed of instructors from the Community College System. These instructors were nominated to serve on the committee by the president of their institution. This committee was the working committee and was responsible for writing and approving the materials that were included in this document. Each of these persons is to be commended for his extra work in developing these materials.

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The Writing and Editing Committee

A special writing and editing committee was established to review, edit, and rewrite all the competency-based curriculum materials. This committee's role was to insure that all the materials were written in the same style and format, and to carefully edit for consistency and correctness of all materials. In addition to the regular committee meetings and home assignments, this group spent many days carefully carrying out their assignments. The Community College System is indebted to them for their dedication and sincere efforts.

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INTRODUCTION

Auto Body Repair curriculums have been offered in the System since the early 1960's. They were designed to prepare individuals to enter employment in franchise dealerships and independent garages as advanced-level apprentices with the basic skills and knowledges of auto body repair. Each program throughout the System has strived to be responsive to the needs of local employers and to keep abreast of changes in the industry. In recent years some of these changes have been developed at a pace that has made it necessary to completely review the curriculum to assure that students leaving the program have the skills and knowledge applicable to today's employment needs.

This curriculum project was designed to involve employers and employees in the curriculum development process by getting their opinion on what basic tasks employees must be able to perform and what knowledge they must have to be successful on the job.

The tasks included in this manual were submitted to employers, employees, and teachers from the Community College System for their review and evaluation as to the need to be included in the curriculum. The tasks they recommended were then organized into courses and subsequently into a model curriculum. This model curriculum may be adopted by the institution or the institution may elect to develop its own curriculum or shift tasks from one course to another. It is suggested that all tasks be included in whatever curriculum is adopted by the institution. These tasks should be the minimum required in the curriculum to assure that students qualify for today's employment needs. The institution is encouraged to consult with local advisory committees for their advice on additional knowledge and skills needed to be taught and to determine where emphasis should be placed in developing skills. As new model cars appear on the market new innovations may appear that require additional tasks to be included in the curriculum. This manual is designed so these new tasks can be quickly and easily added to the curriculum.

Competency statements were written for each task included in the curriculum model. Included with each competency statement are criterion measures. These criterion measures are statements of the level of performance a person should obtain in order to be qualified for a job. It is intended that persons completing this curriculum will be able to perform the task at the competency level described by the criterion measures.

DICTIONARY OF OCCUPATIONAL TITLES - JOB TITLES IDENTIFIED BY QUARTERS

First Quarter

806.684-038 AUTOMOBILE-ACCESSORIES INSTALLER (auto. ser.)

Installs automobile accessories, such as heaters, radios, antennas, safety seat belts, seat covers, or special clamps, and mirrors: Drills and taps holes, assembles and fits accessories to automobile, and tightens bolts and clamps. May be designated according to specialty as Radio Installer, Automobile.

The person performing this job must be competent in the following areas:

- #37 Installing movable glass without damage to automobile surfaces and upholstery, securing glass so there are no leaks or wind noises and glass units operate smoothly.
- #55 Removing inside soft trim and replacing if damaged with appropriate trim to restore to original style and condition.
- #58 Repairing vinyl covers using correct materials and procedures to assure color match, grain match, a strong bond, and weather-proof seal for the top.
- #64 Removing and replacing exterior moldings and ornamentation using proper types of retainers, adhesives and tools assuring alignment with adjoining moldings without damage to paint or other panels and molding.
- #75 Cleaning car inside and outside by washing, vacuuming, and other appropriate means to remove all dust and residues.
- #75A Preparing car for delivery by checking cleanliness, functioning of components, and road testing to determine there are no squeaks, rattles, wind noises, or mechanical problems.
- #82 Locating and eliminating water, dust, and air leaks and wind noise so interior of car will be protected and noise level will be at a minimum.

Second Quarter

620.261-018 AUTOMOBILE-REPAIR-SERVICE ESTIMATOR (auto. ser.) automobile inspector; collision estimator; manager, service; mechanic, trouble-shooting; sales associate, garage service; service writer.

Inspects and tests automobiles and trucks to determine need for and cost of repairs: Determines need for repairs by road test, by use of mechanical testing devices; by questioning customer about vehicle's performance, or by visual inspection of vehicle. Estimates cost of repair and prepares itemized work order, listing costs of parts and labor. May make minor adjustments or repairs, such as brake adjustment, battery cable replacement, or hinge lubrication. May supervise automobile-body repairer; automobile mechanic; painter, automotive; and other garage workers. May be designated according to specialty as Truck-Repair-Service Estimator.

241.267-014 APPRAISER, AUTOMOBILE DAMAGE (bus. ser.; insurance)
automobile-damage appraiser; estimator, automobile damage.

Appraises automobile or other vehicle damage to determine cost of repair for insurance claim settlement and attempts to secure agreement with automobile repair shop on cost of repair: Examines damaged vehicle to determine extent of structural, body, mechanical, electrical, or interior damage. Estimates cost of labor and parts to repair or replace each item of damage, using standard automotive labor and parts cost manuals and knowledge of automotive repair. Determines salvage value on total-loss vehicle. Evaluates practicality of repair as opposed to payment of market value of vehicle before accident. Prepares insurance forms to indicate repair-cost estimates and recommendations. Reviews repair-cost estimates with automobile-repair shop to secure agreement on cost of repairs. Occasionally arranges to have damage appraised by another appraiser to resolve disagreement with repair shop on repair cost.

The persons performing a job as automobile-repair-service estimator or automobile damage appraiser must be competent in the following areas:

- #28 Analyzing the damaged area and making an accurate assessment and plan for repairing the damage.
- #48 Locating and identifying suspension component damages and making decision on best method of reconditioning to return vehicle to manufacturer's specifications.
- #49 Checking and determining body frame alignment to determine frame damage, straightening and replacement of frame components to determine repair procedures and cost estimate.

- #56 Estimating collision repair costs using estimator's "crash guides" to determine accurately the parts required, cost of the parts, time and labor estimates, and the overall cost of the repairs.
- #71 Writing a repair order describing vehicle, owner, work to be performed, and date of delivery and preparing an accurate statement of cost.

Third Quarter

825.381-014 AUTOMATIC-WINDOW-SEAT-AND-TOP-LIFT REPAIRER (auto. ser.)
top-lift and automatic-window repairer.

Disassembles, repairs, installs, adjusts, and services hydraulic and electromagnetic automatic lift mechanisms used to raise and lower automobile windows, seats, and tops.

The person performing this job must be competent in the following areas:

- #37 Installing movable glass without damage to automobile surfaces and upholstery, securing glass so there are no leaks or wind noises and glass units operate smoothly.
- #39 Installing and aligning doors to assure correct clearances of door to body and that door opens, closes, fastens securely, and has no leakage or wind noise.
- #55 Removing inside soft trim and replacing if damaged with appropriate trim to restore to original style and condition.
- #58 Repairing vinyl covers using correct materials and procedures to assure color match, grain match, a strong bond, and weatherproof seal for the top.
- #75 Cleaning car inside and outside by washing, vacuuming, and other appropriate means to remove all dust and residues.
- #75A Preparing car for delivery by checking cleanliness, functioning of components, and road testing to determine there are no squeaks, rattles, wind noises, or mechanical problems.
- #77/81 Checking and repairing electrical systems and making minor repairs to return system to its normal operating condition.
- #78 Repairing and replacing seat track and frame so seats function properly and can be positioned to suit owner's needs.
- #82 Locating and eliminating water, dust, and air leaks and wind noise so interior of car will be protected and noise level will be at a minimum.
- #83A Repairing or replacing sunroof panel and component parts so sunroof is aligned, operates properly, and is weatherproof when closed.

- #838 Repairing or replacing T-top roof panels and component parts so panels align and secure in place and are weatherproof

845.684-014 PAINTER HELPER, AUTOMOTIVE (auto. ser.) sander.

Assists Painter, Automotive by preparing surfaces of automotive vehicles, such as automobiles, buses, and trucks, for repainting and polishes repainted vehicles: Sands rough spots on automotive vehicle. Sprays scratched area with filler solution, using spray gun. Applies paper and masking tape to protect unpainted surfaces, such as bumpers, windows, and chrome trim. Removes gloss from intermediate coats of paint, using wet sandpaper, to insure adherence of next coat. Polishes final coat of paint, using polishing compound and cloth. Paints surfaces not readily accessible, such as wheels and underside of fenders, using brush and spray gun. May remove and replace chrome moldings and trim. May brush or spray undercoating material on replaced parts. Performs duties as described under Helper.

The person performing this job must be competent in the following areas:

- #11 Cleaning and preparing a surface for refinishing undercoats that is properly sanded; free of dirt, wax and grease; and ready for undercoats.
- #12 Compounding and buffing a finished or refinished surface to remove minor imperfections, blend finishes, and restore old finishes by removing road film and oxidation without damage to finish.
- #14/15 Selecting materials, mixing and applying undercoats, and preparing surface for topcoat so that surface is smooth, even, free of dirt and grease, and ready to receive topcoat. Selecting correct materials and mixing and properly applying sealers so that the surface will have good color holdout, no bleed through, good topcoat adhesion, and cover minor defects.
- #25 Preparing a smooth, even surface conforming to the original body contour with body solder.
- #34 Sanding surfaces with correct abrasive material and equipment so that surface will match original contours and surface scratches are no coarser than largest sand scratch recommended for the type of topcoat to be applied.
- #61 Cleaning and maintaining spray equipment so all components are in proper operating order
- #64 Removing and replacing exterior moldings and ornamentation using proper types of retainers, adhesives and tools assuring alignment with adjoining moldings without damage to paint or other panels and molding
- #68 Applying proper masking material to protect hardware, trim, glass, and adjoining panels from grinding, sanding, or painting to assure protection of surfaces not to be painted and that painted surfaces are exposed for painting.

- #75 Cleaning car inside and outside by washing, vacuuming, and other appropriate means to remove all dust and residues.

845.381-014 PAINTER, TRANSPORTATION EQUIPMENT (aircraft-aerospace mfg.; air trans.; auto. ser.)

Paints surfaces of transportation equipment, such as automobiles, buses, trucks, and airplanes, according to specifications, using brushes and spray gun: Removes old paint from vehicle, using liquid paint remover and scraper. Smooths surfaces with sandpaper and steel wool. Roughens aluminum surfaces with acid solution and steel wool to insure that paint adheres to surface. Masks and covers portions of surfaces not to be painted. Positions stencils on vehicle surface, according to blueprints, using ruler and pencil. Paints vehicle or specified portion of vehicle, using spray gun or brush. Paints insignia and identifying letters and numerals on aircraft surfaces. May remove accessories from motor vehicles, such as chrome, mirrors, and windshield wipers. May paint designs with brush. May touch up paint, or paint identifying stripes or other symbols on aircraft parts. May be designated according to vehicle type painted as Painter, Aircraft; Painter, Automotive.

In addition to having competencies as a Painter, Helper the Painter will require competency in the following areas:

- #11 Cleaning and preparing a surface for refinishing undercoats that is properly sanded; free of dirt, wax and grease; and ready for undercoats.
- #12 Compounding and buffing a finished or refinished surface to remove minor imperfections, blend finishes, and restore old finishes by removing road film and oxidation without damage to finish.
- #13 Identifying, applying, and spot blending enamels so surface will have uniformity of color, gloss, and finish after spot painting.
- #14/15 Selecting materials, mixing and applying undercoats, and preparing surface for topcoat so that surface is smooth, even, free of dirt and grease, and ready to receive topcoat. Selecting correct materials and mixing and properly applying sealers so that the surface will have good color holdout, no bleed through, good topcoat adhesion, and cover minor defects.
- #16 Applying an overall finish that is commercially acceptable on a conventional vehicle.
- #17 Applying an overall enamel finish that is commercially acceptable on a conventional vehicle.
- #18 Spot blending a lacquer finish and correctly matching color with adjacent surfaces so the spot finish is not detectable.
- #34 Sanding surfaces with correct abrasive material and equipment so that surface will match original contours and surface scratches are no coarser than largest sand scratch recommended for the type of topcoat to be applied.
- #61 Cleaning and maintaining spray equipment so all components are in proper operating order.

- #64 Removing and replacing exterior moldings and ornamentation using proper types of retainers, adhesives and tools assuring alignment with adjoining moldings without damage to paint or other panels and molding.
- #68 Applying proper masking material to protect hardware, trim, glass, and adjoining panels from grinding, sanding, or painting to assure protection of surfaces not to be painted and that painted surfaces are exposed for painting.
- #71 Writing a repair order describing vehicle, owner, work to be performed, and date of delivery and preparing an accurate statement of cost.
- #75 Cleaning car inside and outside by washing, vacuuming, and other appropriate means to remove all dust and residues.
- #84 Recognizing paint problems, identifying common causes, and prescribing preventive measures and corrective procedures to correct paint to customer's satisfaction.
- #85 Applying striping with appropriate color material to replace original stripes according to original pattern or to owner's satisfaction.

Fourth Quarter

807.361-010 AUTOMOBILE-BODY CUSTOMIZER (auto. ser.)

Installs custom equipment to alter appearance of automotive vehicle according to customer specifications, using handtools and power tools: Reads specifications or confers with customer to determine modifications desired. Cuts opening in vehicle body for installation of customized windows, using templates, and power shears or chisel. Measures and marks vinyl material and cuts material to size for roof installation, using rule, straightedge, and hand shears. Cuts and bends metal trim to specified size and configurations, using power shears and chrome-bending die. Fits and secures windows, vinyl roof, and metal trim, using caulking gun, adhesive brush, and mallet.

This job position requires a very high skill level in all areas of auto body work with the exception of damage repair. This person may or may not repair actual damage but must understand how the total vehicle functions.

In addition to the competencies required as a Automobile Accessories Installer; Automobile-Repair-Service Estimator; Appraiser, Automobile Damage; Painter, Transportation Equipment; Painter Helper, Automotive; Automatic Window, Seat, and Top Lift Repairer this person must have the following competencies:

- #19 Welding various thickness of auto body metal with the oxyacetylene welding process to form a structurally sound bond that can be smoothed and prepared for finishing.
- #20 Flame cutting metal with oxyacetylene process without damage to adjacent parts following safe practices.

- #21 Welding heavy gauge metal with the arc welding process so the weld joint is structurally sound and the appearance is acceptable.
- #22 Welding auto body metal panels with spot welding process so the panel is in proper alignment and the joint is as strong as the original joint and neat and acceptable in appearance.
- #23 Welding auto body metal with the metallic inert gas process so that weld is structurally sound and appropriately neat in appearance.
- #24 Brazing sheet metal with the oxyacetylene welding process to assure a smooth and structurally sound weld.
- #26 Filling damaged body areas with body plastics to conform to the original body contour with a smooth even surface without pin holes and with sand scratches no more than eighty grit.
- #32 Filing and picking sheet metal to straighten to original contour so flaws are not visually detectable.
- #35 Repairing scratches and gouges in fiberglass panels using correct tools and materials so that panel is structurally sound and surface is smoothed for undercoat.
- #36 Removing and replacing a fiberglass panel using correct tools and materials to remove damaged panel and to fit and bond new panel to original body contours.
- #38 Installing stationary glass without damage to automobile surfaces or moldings, securing glass and molding safely, properly, and without leaks or wind noises.
- #39A Installing and aligning deck lid so lid is centered in opening, operates smoothly, fastens securely, and is weatherproof.
- #40/63 Aligning body shell to return body alignment to original body contours so that doors, glass, and deck lid fit and operate correctly.
- #41 Installing a rear clip so that clip is aligned correctly and windows and deck lid fit correctly, are weatherproof, and all joints are structurally as strong as the original body.
- #42/51 Installing and aligning front sheet metal and panels so components are properly fastened and aligned and there are no squeaks or rattles.
- #43 Aligning body on frame so body is level and square with frame.
- #46 Aligning rear end suspension components to within manufacturer's specifications.
- #47 Aligning front end suspension components using appropriate gauges and equipment to bring within manufacturer's specifications.

#52/53 Replacing damaged air conditioning components with correct replacement parts, securing properly and torquing fastenings to assure system does not leak. (TASK: Replaces air conditioning components)

Evacuating and recharging system with freon using gauges to check pressures and assure filling with appropriate amount of refrigerant (TASK: Recharges air conditioning system with freon)

#57 Removing and replacing quarter panel and component parts so panel will align with component panels, glass, moldings and bumpers without wind noise, water, or dust leaks with proper spacing around quarter panel. (TASK: Replaces quarter panel)

#59 Removing and replacing decals without damage to surface from which removed and replacing decals in correct position and sealing without air bubbles or wrinkles.

#60 Using proper tools and equipment to aim headlights to correct specifications.

#62/
65/67 Installing partial panel using steel and forming to original body contours by welding to restore to correct structural strength with panel aligned in proper relationship to other panels.

#66 Removing door outer panels, disassembling door component parts and replacing with outer panel so edges are smooth and component panels fit in opening and door operates properly.

#79 Removing and replacing fuel tank following safe procedures for handling gasoline and correct procedures for removing and installing to assure tank is secure and does not leak.

#80 Replacing and repairing bumper assemblies by replacing parts with correct parts and installing so bumper is aligned with frame and body with equal overhang, proper clearance, and is level.

#83 Installing roof panel and component parts so panels are aligned and do not leak.

#86 Repairing plastic parts by welding process so joint is structurally sound and can be refinished to original contour and color.

#87 Removing vinyl top without damaging material and vehicle and replacing vinyl top so top is aligned properly, smooth, free of air bubbles, and secured properly to metal surfaces.

807.381-010 AUTOMOBILE-BODY REPAIRER (auto ser.) automobile-body worker; body-line finisher; body repairer, bus; dent remover; door repairer, bus; metal bumper; metal shrinker; metal worker; touch-up finisher, metal.

Repairs damaged bodies and body parts of automotive vehicles, such as automobiles, buses, and light trucks according to repair manuals, using handtools and power tools: Examines damaged vehicles and estimates cost of repairs. Removes upholstery, accessories, electrical and hydraulic window-and-seat-operating equipment, and trim to gain access to vehicle body and fenders. Positions dolly block against surface of dented area and beats opposite surface to remove dents, using hammer. Fills depressions with solder or other plastic material. Removes damaged fenders, panels, and grills, using wrenches and cutting torch, and bolts or welds replacement parts in position, using wrenches or welding equipment. Straightens bent frames, using hydraulic jack and pulling device. Files, grinds, and sands repaired surfaces, using power tools and handtools. Refinishes repaired surface, using paint spray gun and sander. Aims headlights, aligns wheels, and bleeds hydraulic brake system. May paint surfaces after performing body repairs and be designated Automobile-Body Repairer, Combination. May repair or replace defective mechanical parts.

This job position requires the person to be skilled in all areas of auto body repair. This person must be able to perform each task at the skill level of competency without supervision.

In addition to the competencies required as a Automobile Accessories Installer; Automobile-Repair-Service Estimator; Appraiser, Automobile Damage; Painter, Transportation Equipment; Painter Helper, Automotive; Automatic Window, Seat, and Top Lift Repairer; and Automobile-Body Customizer this person must have the following competencies:

- #29/
30/31 Preparing damaged panel for straightening or filling by roughing out panels to align and return to general body contour and making sure that body panels fit and operate correctly.
- #44/45 Checking and determining body frame alignment to determine frame damage and straighten frame to bring within manufacturer's specifications.
- #50 Inspecting cooling system to determine repair work necessary, making decision on repair and materials needed, and repairing system to operate within manufacturer's specifications without leaks.
- #54 Inspecting for damage and repairing or replacing transmission cooling lines with correct replacement parts making sure there are no oil leaks.
- #76 Diagnosing repair needs for steering column and steering components and making repairs to return steering assembly to proper operating condition and manufacturer's specifications.

Each phase of the project was designed to assure maximum involvement in the developmental process. In order to assure involvement a curriculum committee was appointed.

The curriculum committee was composed of teachers from the Community College System. The presidents of the institutions in the Community College System offering auto body repair curriculums nominated persons from their institutions to serve on the curriculum committee. This committee was a working committee and was responsible for writing and preparing all materials including the job title survey, task inventory survey, task analysis and competencies.

METHOD OF USING TASK ANALYSIS

The task analyses are designed so the instructor can use them to determine how to teach each task, when to teach a task, and to some degree the amount of emphasis placed on each task. Each institution should very carefully review each of the task analysis and the survey data. They should then involve an active advisory committee of employers and employees from the area the institution serves to advise them in planning the curriculum. The advisory committee can give advice on organization and emphasis to be placed on a task and can help to decide on the hierarchical order of importance for teaching each task. The instructors should determine the courses to be taught, the sequence and length of the courses and which tasks are to be taught in each course. The knowledge/theory can be used to prepare the basic outline of theory to be taught when the decision has been made in which course each task will be taught.

TASK ANALYSIS

The task analysis provides to the educator the information needed to determine what is to be taught and the level of skill necessary to function effectively on the job. Each task confirmed by the survey as being necessary for the employee to perform was analyzed to identify the competency required, the criterion of satisfactory performance, the skills or process the employee must have or follow in performing the task, the knowledge or theory one must know to effectively perform the task and attitudes and values needed to be successful in carrying out the task assigned.

COMPETENCIES

Each task was restated as a competency statement. The competency statement defines the degree of accuracy and/or proficiency the employee should attain in performing the assigned task. The competencies, as well as the tasks, are written to reflect the level of performance necessary for the employee to be successful on the job. The employee should be able to perform the task at the competency level as measured by the criterion.

CRITERION

The criterions for each competency were stated as a measure of what the employee can do in carrying out the assigned task to the level of competency stated. These criterions are used to judge success or degree of accuracy to which the assigned task is performed. These were written to reflect the critical performance standards for the competency.

SKILL/PROCESS

The skill/process provides the basic steps and skills the employee must perform in order to do the task at the level of competency. Each person must be able to perform each skill/process in order to effectively complete the task as assigned at a level of proficiency acceptable by the industry. The skill/process statements or steps may also be considered as sub-tasks. These sub-tasks may be assignable jobs to be carried out in the employing operation or in the teaching/learning setting.

KNOWLEDGE/THEORY

The knowledge/theory is outlined to provide the basic principles and concepts an employee needs to be successful in the employing world. It is essential information the employee needs to know in order to understand the why, how, and relationships of the function of the task, its component parts, or its purpose within the system. The knowledge/theory should be an integral part of the instructional program to assure that the person has the foundation to build skills and to keep those skills current.

VALUE/ATTITUDE

The value/attitude concepts are those concepts unique to the task that shape personal behavior in carrying out the task assigned in a particular manner and to a specified degree of accuracy. There are many attitudes and values that should be included throughout the curriculum. Those value/attitudes that should be continuously stressed are not repeated from task to task.

DEVELOPMENT OF TASKS FOR SURVEY

The tasks used in the survey were developed by the working committee of instructors from the institutions and the staff coordinator for the project. The committee identified ten major component areas of instructional needs in the auto body repair field. These were: metalworking and fiberglass, painting, frame and suspension, glass and trim, estimating, electrical, cooling systems, accessories, servicing, and welding. These component areas were analyzed to determine all the assignable job tasks a mechanic would perform in the course of maintaining and restoring an automobile body. The tasks were carefully written and reviewed by the committee in an attempt to list every possible assignable task performed by an employee. Three reviews of the tasks were made prior to organizing them into the survey format. The tasks were then prepared into survey format for each committee member to re-evaluate. This careful review provided the final list of seventy-one tasks for the survey. (See Appendix A.)

DEFINITIONS OF TERMS USED IN THIS PROJECT

Competency is a statement of a task to be performed with a specified degree of accuracy and/or proficiency.

Criterion measure is a statement of the predetermined standard to which an employee can perform, or must be able to perform, a given task. The criterion measures are those conditions used in evaluating job performance and the performance of the completed function.

Knowledge/Theory is the theoretical information one must know in order to understand the why, how, and relationships of the function of the task, its component parts, or its purpose within a system.

Manufacturer's recommendations refers to the steps or manner in which the manufacturer has prescribed a process for servicing, repairing, overhauling, or rebuilding.

Manufacturer's specifications are the tolerances and limits as prescribed by the manufacturer of the component or assembly for use in a given manner.

Overhaul is used to denote the rebuilding and the reconditioning by machining process, welding, or other methods to specifications and the reassembling with serviceable and/or new or reconditioned components.

Rebuild is used to denote the disassembly, cleaning, checking, replacement of parts with new or reconditioned parts, reassembly, and carrying out of recommended procedures and tests to assure functioning according to manufacturer's specifications.

Recondition is used to indicate the restoring of a component or an assembly to condition equal to, or better than, the original by machining, welding, replacing components, and/or restoring with other materials or methods which are acceptable to the industry as being equal to, or better than, the original.

Repair is used to denote the action of putting back in good condition after damage using such methods as welding, reforming to original shape, or splicing and taping of wiring.

Replace is used to indicate when something is exchanged with another: generally to replace a used, damaged, or broken part with a new or undamaged part.

Service is used to denote the periodic maintenance, such as oiling, greasing, replacing filters, cleaning, and/or adjustment of components of an engine, the total engine, or the vehicle.

Skills/Process information is an analysis of the task to identify basic skills and/or the process one must be able to perform and must know in order to perform the task.

Task area is the grouping of related tasks into a specific major segment of the job such as painting, glass and trim, cooling systems, etc.

Task statements used in this document are statements of a distinct unit of work (job) that an employee would be assigned to do in the performance of the job. The tasks listed were those that could normally be independently assigned in the actual job situation.

Value/Attitude concepts are those concepts unique to the task that shape personal behavior in carrying out the task assigned in a particular manner and to a specified degree of accuracy.

SURVEY

One of the important goals of this curriculum review was to provide maximum input from as many employers, employees, and educators as feasible. In addition to a curriculum committee and a curriculum advisory committee, a mail survey of the tasks (See Appendix A) was developed and distributed to employers and employees in the auto body repair industry and to all auto body repair educators in the community colleges, technical colleges, and technical institutes offering the Auto Body Repair curriculum.

The survey was developed by the curriculum committee and was modeled after a survey of the same type used by James D. Howell in his dissertation, "An Identification of the Competencies in English Needed by Vocational Students in the Community Colleges and Technical Institutes in North Carolina."

The survey consisted of 71 items the curriculum committee considered as potential tasks employees in the auto body repair industry might perform. Each respondent was requested to rate the tasks on a scale of one to five to indicate his/her opinion of the importance of employee competency in performing the task to job performance. The scale was: (1) no competency in this activity, (2) slight competency in the activity, (3) moderate competency in the activity, (4) considerable

competency in the activity, and (5) complete competency in the activity. Webster's definitions (Competent 1. Well qualified, capable, fit; and Competency 2. Condition or quality of being competent) were listed on the survey to provide guidance and a common reference frame.

Twenty copies of each survey were distributed to the head auto body instructor in the 25 institutions offering Auto Body Repair curriculums in the System. They were asked to distribute the surveys to each auto body instructor on their staff and to employers and employees in the community their curriculum served.

Five hundred surveys were sent to the head instructors. Eighty-eight were returned (17.6%). Employer (30) and employee (35) returns were almost equal with fewer educators (19) responding. While the number of returns was not very high, it was sufficient to indicate trends and to provide a basis for determining the tasks most important to the industry.

NUMBERING OF TASKS

The tasks were numbered when the survey was made. In order to accommodate the processing of the survey returns by data processing, it was necessary to provide identification information on the computer. The numbers 1-10 were left for this information and the task numbering began with number 11. Therefore, Task 11 is actually the first task. These numbers were maintained throughout the document. After the survey was completed and analyzed and during the writing of the task analyses, additional tasks were added. When these tasks represented a new area or subject a new number was given by picking up the next number after the last numbered task. In many cases when the task analyses were being written it became necessary to add additional tasks to the task being analyzed. When this was necessary the same number was given to the task with a letter suffix such as Task 83, Task 83A, and Task 83B.

ANALYSIS OF DATA

The information received from the survey was compiled into four ratings: (1) how the group rated each task, (2) how the employers rated each task, (3) how the employee rated each task, and (4) how the educator rated each task. The items were listed in rank order ranging from the highest total group rating to the lowest total group rating. Statistical analyses were not made to show significant differences between how each group rated each item. A complete listing of the tasks in rank order of rating from 1 (highest rating) to 71 is shown on the table in this chapter. This table provides information on the rank order, the task, the number of respondents, the group rating, the employer rating, the employee rating, the educators' rating, and the frequency of responses for each item in the scale for each task.

An analysis of this data indicates that the employers, educators, and employees are in close agreement and when all tasks are combined that each rank the importance of the task about the same. It is interesting, however, to note that the employee and the educator both rank the importance of the task higher than the employer. This tends to indicate that both the employee and the educator perceive a higher level

of performance as important to job performance than does the employer. The following are six comparisons of the data which tend to support the higher level of performance desired by the employees and educators (See Table 1).

- . The employers rated 39 items higher and 32 items lower than the group.
- . The employees rated 32 items higher and 39 items lower than the group.
- . The educators rated 34 items higher and 37 items lower than the group.
- . The employers rated 29 items higher and 42 items lower than the employees.
- . The employers rated 32 items higher and 39 items lower than the educators.
- . The employees rated 34 items higher, one item equal, and 36 items lower than the educators.

Table 1

Comparison of Rating of Total Items Between Each Group

	Total Items	Items Rated Higher	Items Rated Equal	Items Rated Lower
Group versus employers	71	39	0	32
Group versus employees	71	32	0	39
Group versus educators	71	34	0	37
Employer versus employee	71	29	0	42
Employer versus educator	71	32	0	39
Employee versus educator	71	34	1	36

HOW DATA WAS USED

The intent in making the survey was to provide employer-employee input into the curriculum development process and to be able to compare the relationship between industry and education views. The survey data provides a means of comparing the importance that each group attaches to each task. The ratings of the group were compared with the rankings of the employers, employees, and educators to see if there was agreement or a difference as to how each rated the importance of the item. Where there was a difference the committee attempted to determine the reason for the difference and to make allowances for this in the analysis. Items ranked very low by the group were carefully screened by the committee but were included in the curriculum since they were basic to another task.

The educators on the committee were given the prerogative to decide which tasks should be maintained in the curriculum, the emphasis to be placed on each task competency, and the order in which the tasks would be suggested to be taught in the curriculum. The educators also determined the need to consolidate some of the tasks after the survey was made.

Some of the questionnaires returned included comments and suggested additional tasks. The comments were carefully considered by the committee completing the writing of the materials and the tasks were reviewed to assure that each comment was appropriately included in the task analysis. Four additional tasks to be included in the curriculum were identified, three from the suggested list and one suggested by the committee.

ADDITIONAL TASKS SUGGESTED ON SURVEY RETURNS

The following is a list of tasks suggested by the respondents on the survey. No attempt has been made to rewrite these items into a task statement to conform to the original task format. Three tasks, Number 16 (written as two tasks, A & B) and Number 21, were selected to be added to the list of tasks by the committee. Each of the remaining statements was carefully screened and found to be included in an existing task as each task analysis was completed.

1. Learn the procedure of unitized body alignment, body, and frame alignment at same time
2. Shop safety practices
3. Welding safety near fuel tanks and lines
4. Be neat in appearance
5. Conserve and not waste supplies
6. Be dependable concerning work quality
7. Be dependable in attendance at work
8. Be familiar with the latest paint and materials made available by all major paint companies
9. Utilize a fire extinguisher
10. The use of sandblasting in rusted area
11. Pay procedure in different shops
12. Automotive tune-up
13. Legal responsibility
14. Has tools and knows how to use
15. Install front clips
16. Install roof panels
17. Straightens and aligns roof panels
18. The beginning of any body repair school should start with the frame then the body shell alignment
19. Door glass alignment
20. Electrical doorglass repair
21. Identify paint problems: their cause and cure
22. Ability to consult with owners and handle complaints
23. Install front clip
24. Check for water and dust leaks and repair satisfactorily
25. Pinstripe and add decals with air brush

COMMENTS ON SURVEY RETURNS

The following comments were made by the survey respondents. They were carefully reviewed and considered by the committee as the tasks were analyzed.

1. Having talked with some who have completed this course, I feel that for a student who has already graduated from high school, too much time is spent studying history, English, business math, etc. More time should be spent in the lab doing actual work. Time element should be stressed too. Most large shops operate on a commission basis.

2. To do body work a man must have love for his work and not think of it as just a job. It does take a person with a "want" to be a success.
3. In reference to Task #34 - a must
4. In reference to Task #38 - outside labor
5. In reference to Task #48-49 - shop foreman does this
6. In reference to Task #56 - shop foreman does this
7. In reference to Task #68 - painter helper does mostly
8. In reference to Task #72 - a must
9. In reference to Task #75 - helper does this
10. In reference to Task #77 - add electric door locks

METHODOLOGY USED IN THE PROJECT

This curriculum project identified the competencies necessary for successful employment in auto body repair occupations in response to concerns that auto body repair curricula in the System provide:

1. A quality of instruction which makes it possible for individuals completing a curriculum or phase of a curriculum to be prepared for employment;
2. Articulation between secondary and post-secondary vocational-technical curriculums;
3. Involvement of employers, employees, and educators in curriculum development; and
4. Assurance that curricula are up-to-date in accordance with current job technology requirements.

In response to these concerns the project provided (1) a validated list of career (job) opportunities for which each curriculum provides training and education; (2) the tasks performed by employees in each job; and (3) a list of competencies and evaluative criteria essential to successfully perform in the job.

The procedure for conducting this project was accomplished in four phases:

Phase I of the project identified the Auto Body Repair curriculum as one for which competencies were to be developed.

Phase II of the project was a search for existing competency-based curriculum materials. These materials were used as resources in writing the materials herein.

Phase III of the project identified and validated the career opportunities (job titles) currently used by the auto body repair industry. The career opportunities were identified from the Dictionary of Occupational Titles.

A job analysis was made to determine the tasks the person performs in carrying out the function of the job. The tasks were validated by surveying employers, employees, and educators.

Phase IV of the project analyzed each task to determine the skill or skills needed, the technical knowledge needed, and the attitudes/values necessary for functioning successfully in the job. From the task analysis, competencies were written with criterion for measuring performance.

V-001 Automotive Body Repair

DEPARTMENT OF COMMUNITY COLLEGES
OCCUPATIONAL PROGRAM SERVICES SECTION
RALEIGH, NORTH CAROLINA

COMPONENT AREAS

JOB PERFORMANCE TASKS

ACCESSORIES	#83A REPAIRS OR REPLACES SUN ROOF AND COMPONENTS	#83B REPAIRS OR REPLACES T-TOP ROOF PANEL AND COMPONENT PARTS	#87 REMOVES AND REPLACES VINYL TOPS					
COOLING SYSTEM	#50 REPAIRS OR REPLACES & TESTS COOLING SYSTEM COMPONENTS	#52 REPLACES AIR COND. COMPONENTS #53 RECHARGES AIR COND. SYSTEM WITH FREON	#54 REPAIRS AND REPLACES TRANSMISSION COOLING LINES					
ELECTRICAL	#60 AIMS HEADLAMP	#77 CHECKS AND REP. ELECT. CIR. #78 SERVICES BATTERY SAFELY						
ESTIMATING	#28 ANALYZES DAMAGED AREA	#56 ESTIMATES COLLISION REPAIR COSTS	#71 WRITES REPAIR ORDERS & PREPARES STATEMENT OF COST					
FRAME & SUSPENSION	#43 ALIGNS BODY ON FRAME	#44 CHECKS AND REP. FRAME DAM. #45 REPLACES DAMAGED FRAME COMPONENTS	#46 ALIGNS REAR END SUSPENSION PARTS	#47 ALIGNS FRONT END SUSPENSION PARTS	#48 LOCATES AND IDENTIFIES SUSPENSION DAMAGE	#49 LOCATES AND IDENTIFIES FRAME DAMAGE	#76 DIAGNOSES & REPLACES STEERING COLUMN & STEERING COMPONENTS	#80 REPLACES AND OVERHAULS BUMPER ASSEMBLIES
GLASS AND TRIM	#37 INSTALLS MOVABLE GLASS	#38 INSTALLS STATIONARY GLASS	#55 REMOVES AND REPLACES INSIDE SOFT TRIM	#58 REPAIRS VINYL COMPONENTS	#59 INSTALLS DECALS	#64 REMOVES AND REPLACES EXTERIOR MOLDINGS AND ORNAMENTATION	#78 REPAIRS AND REPLACES SEAT TRACKS & FRAMES	
METALWORKING AND FIBERGLASS	#25 FILLS WITH BODY SOLDER	#35 REPAIRS FIBERGLASS PANEL SCATCHES, GOUGES AND CRACKS	#26 FILLS WITH BODY PLASTICS	29/30/31 PREPARES DAMAGED PANEL FOR STRAIGHTENING OR FILLING, ROUGHS OUT DAMAGED AREA, & SHRINKS STRETCHED METAL	#32 FILES AND PICKS SHEET METAL TO STRAIGHTEN	#36 REMOVES & REPLACES FIBER-GLASS PANEL	#39 INSTALLS AND ALIGNS DOOR	#39A INSTALLS AND ALIGNS DECK LID
	#40 ALIGNS BODY SHELL #63 UTILIZE LIFT-ING EQUIPMENT	#41 INSTALLS REAR CLIP	#42 INSTALLS AND ALIGNS FRONT SH. METAL & PANELS #51 REPLACES RAD. & RADIATOR SUPP.	#57 REPLACES QUARTER PANEL	#62 INSTALLS PARTIAL PANELS USING STEEL, FIBER-GLASS, OR OTHER MATERIALS #65 REPAIRS RUSTED AREAS #67 REPAIRS & INSTALLS ROCKER PANELS	#66 INSTALLS OUTER DOOR PANELS	#79 REMOVES AND REPLACES FUEL TANK & CHECKS LINES FOR LEAKS	#83 INSTALL SOLID ROOF PANELS
PAINTING	#11 CLEANS & PREPARES A SURFACE FOR UNDERCOATS	#12 COMPOUNDS & BUFFS A FINISH, OR REFINISHED SURFACE	#13 IDENTIFIES, APPLIES, & SPOT BLENDS ENAMELS	#14/15 SEL. CORRECT MATS.; MIXES & PROP. APPLIES UNDERCOAT MATS. & SEALERS	#16 APPLIES AN OVERALL LACQUER FINISH	#17 APPLIES AN OVERALL ENAMEL FINISH	#18 SPOT BLENDS A LACQUER FINISH	#34 SANDS SURFACE WITH ABRASIVE MAT & EQUIP. IN PREP. FOR TOPCOAT
	#61 CLEANS & MAINTAINS SPRAY EQUIPMENT	#68 MASK BEFORE PAINTING	#84 IDENTIFIES PAINT PROBLEMS	#85 APPLIES STRIPING				
SERVICING	#75 CLEANS UP & PREPARES A CAR FOR DELIVERY	#75A ROAD TESTS & CHECKS CAR FOR DELIVERY	#82 LOCATES AND ELIMINATES LEAKS AND NOISES					
WELDING	#19 WELDS SHEET METAL WITH OXY-ACETYLENE WELDING PROCESS	#20 FLAME CUTS METALS WITH THE OXYACETYLENE CUTTING PROCESS	#21 WELDS HEAVY GAUGE METAL WITH THE ARC WELDING PROCESS	#22 WELDS AUTO METALS WITH SPOT WELDING PROCESS	#23 WELDS METALS WITH THE METALLIC INERT GAS (MIG) PROCESS	#24 BRAZES SHEET METAL WITH THE OXYACETYLENE WELDING PROCESS	#86 REPAIRS PLASTIC PARTS	

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TASK AREA:	Painting
TASK #11:	Cleans and prepares a surface for undercoats
COMPETENCY:	Clean and prepare a surface for undercoats that is properly sanded; free of dirt, wax and grease; and ready for undercoats
CRITERION:	Can clean surfaces by using correct cleaners to remove grease, wax, and dirt Can use power sanding and hand sanding methods to obtain smooth surface and feathered edges Can sand surfaces to strip old finish so that a smooth surface with edges feathered is ready for undercoats Can safely remove paint using correct chemical remover
SKILL/PROCESS:	1. Wash the surface 2. Remove wax and grease 3. Strip old finish a. Strip with chemicals b. Strip with abrasives 4. Sand and feather edges 5. Condition metal 6. Clean all surfaces 7. Mask areas to be protected
KNOWLEDGE/THEORY:	1. Knows the proper use of detergents and cleaning methods 2. Knows the proper use of solvents to lift oil, wax, and grease from substrate 3. Knows how to select abrasives 4. Knows how to feather broken edges of old finish using abrasives 5. Knows how to use correct abrasives a. Wet or dry sanding b. Painted or metal surfaces c. Power sanding d. Block sanding e. Cleaning 6. Knows process of paint removal using chemical paint solvents 7. Knows how to use correct materials for conditioning of various substrates a. Steel b. Aluminum c. Galvanized steel d. Fiberglass e. Plastics 8. Knows how to mask surfaces to protect from damage and spray

- a. Masking materials
- b. Masking equipment
- c. Masking methods
- d. Masking removal
- e. Masking clean up

VALUE/ATTITUDE
CONCEPTS:

Understands and appreciates the importance of proper preparation of surface area to assure quality workmanship

TASK AREA:	Painting
TASK #12:	Compounds and buffs a finished or refinished surface
COMPETENCY:	Compound and buff a finished or refinished surface to remove minor imperfections, blend finishes, and restore old finishes by removing road film and oxidation without damage to finish
CRITERION:	Can prepare the surface for compounding by cleaning Can determine the correct materials and method of application for compounding Can compound the surfaces removing minor imperfections Can compound and buff the surface to blend with existing finish Can use power buffing equipment without damaging or removing excessive amount of finish
SKILL/PROCESS:	1. Clean the vehicle surface 2. Light sand nibs from painted surface 3. Select compound materials 4. Select, clean, and set up equipment 5. Protect (tape) creases and protruding edges 6. Apply compound and buff 7. Remove tape and hand compound creases and protruding surfaces 8. Clean vehicle 9. Remove swirl marks
KNOWLEDGE/THEORY:	1. Knows use of detergents and cleaning methods 2. Knows use of proper materials a. Light sanding abrasives b. Compounding abrasives 3. Knows use of proper tools and methods of compounding and buffing a. Hand sanding and compounding b. Power tools c. Buffing pads 4. Knows proper precautions a. Burning the paint b. Cutting through the paint c. Protection of chrome d. Protection of worker 5. Knows proper treatment of new surfaces to remove minor scratches and swirls a. Materials b. Tools c. Methods (1) Hand (2) Power d. Precautions

6. Knows proper treatment of old surfaces to remove road film and surface oxidation
 - a. Materials
 - b. Tools
 - c. Methods
 - (1) Hand
 - (2) Power
 - d. Precautions

VALUE/ATTITUDE
CONCEPTS:

Understands the importance of procedures to obtain maximum quality for customer approval

TASK AREA:	Painting
TASK #13:	Identifies, applies, and spot blends enamels
COMPETENCY:	Identify, apply, and spot blend enamels so surface will have uniformity of color, gloss, and finish after spot painting
CRITERION:	Can identify surface painted with enamel paints by visual inspection and by verification of code and/or with lacquer thinner Can prepare the surface by sanding and feathering edges Can mix and apply sealers and/or primers to surface by spraying and properly covering surface Can apply finished coat by mixing paint and spraying each coat to blend with original finish Can use reducer or compound to blend with original finish
SKILL/PROCESS:	1. Identify paint by paint code 2. Prepare surface for topcoat 3. Select and mix paint and prepare blending materials 4. Set up, clean, and adjust equipment 5. Tack surfaces 6. Apply blending material 7. Apply color coats feathering each successive coat and blending between coats 8. Apply final blending coat 9. Clean equipment 10. Remove masking 11. Check and clean vehicle
KNOWLEDGE/THEORY:	1. Knows different types of enamels a. Alkyds b. Acrylics c. Metallics d. Isocyanates e. Polyurethane f. Epoxy 2. Knows different paint codes a. Location b. Meaning of code c. Cross reference d. Formulation of paint by code 3. Knows proper procedures for preparing surface area 4. Knows how to apply primer 5. Knows procedures for block sanding 6. Knows how to remove abrasives, dirt, and grime and how to blow dry

7. Knows how to reverse masking, materials, and techniques used in masking
8. Knows how to clean the surface using mild solvents, including the area to be used for blending
9. Knows how to prepare blend area by compounding
10. Knows how to prepare blending and topcoat materials
11. Knows how to adjust spray gun
12. Knows how to apply topcoat and blend with surrounding area
13. Knows how to clean spray gun
14. Knows how to remove masking
15. Knows how to compound to blend spot repair with old finish
16. Knows how to clean up

**VALUE/ATTITUDE
CONCEPTS:**

Understands the importance of proper matching and blending to assure customer approval and satisfaction

TASK AREA:	Painting
TASK #14/15:	Selects correct materials; mixes and properly applies undercoat materials and sealers
COMPETENCY:	Select materials, mix and apply undercoats, and prepare surface for topcoat so that surface is smooth, even, free of dirt and grease, and ready to receive topcoat. Select correct materials and mix and properly apply sealers so that the surface will have good color holdout, no bleed through, good topcoat adhesion, and cover minor defects
CRITERION:	Can select and mix the correct undercoating materials for the type of paint finish Can apply the undercoat by spraying the correct type of undercoats smoothly and feathering edges with existing finishes Can select and mix sealers for the type of surface to be covered Can apply an even coat with proper coverage to prevent bleed through and to have good adhesion and holdout
SKILL/PROCESS:	1. Select proper undercoat 2. Mix primer undercoat 3. Set up, clean, and adjust spray equipment 4. Mask surfaces to be protected 5. Apply primer undercoat 6. Clean equipment 7. Sand primer undercoat. 8. Remove masking 9. Clean surface 10. Mask surfaces to be protected and attach ground 11. Select proper sealer and mix 12. Clean and adjust spray equipment 13. Clean vehicle with air and wipe 14. Tack wipe 15. Apply sealer 16. Clean equipment
KNOWLEDGE/THEORY:	1. Knows how to clean surface without scratching, proper use of detergents, and how to blow dry 2. Knows how to use light solvents to float contaminants to the surface, wiping thoroughly with clean rag while surface is still wet 3. Knows how to use abrasive papers, hand or power sanding 4. Knows process of rust or oxidation retardation a. Steel b. Aluminum

- c. Galvanized metal
- 5. Knows use of primer-surfacers
 - a. Use on steel
 - b. Use on aluminum
 - c. Use on fiberglass
 - d. Use on plastics
 - e. Use on galvanized metal
 - f. Use over old topcoats and undercoats
- 6. Knows use of lacquer-primer sealers
 - a. Use on sanded original finishes
 - b. Primer-surfacers
 - c. Clean bare metal
- 7. Knows use of enamel-primer sealers
 - a. Use on steel
 - b. Use on aluminum
 - c. Galvanized metals - properly treated
- 8. Knows use of primers
- 9. Knows how to follow manufacturer's directions on labels
- 10. Knows how to mix undercoat with proper solvent
- 11. Knows how to adjust spray gun
 - a. Air pressure
 - b. Spraying techniques - wet thin coats
- 12. Knows how to seal a newly painted surface during sensitive period prior to recoating - alkyd and acrylic enamels
- 13. Knows how to restrict some red and maroon colors from bleeding through to the top surface
- 14. Knows how to follow manufacturer's instructions on labels

**VALUE/ATTITUDE
CONCEPTS:**

Understands the importance of clean working habits, reducing trash, protecting the metal, and proper application procedures to assure quality workmanship

TASK AREA:	Painting
TASK #16:	Applies an overall lacquer finish
COMPETENCY:	Apply an overall finish that is commercially acceptable on a conventional vehicle
CRITERION:	Can mix lacquer paint to correct color and consistency for each coat Can prepare and adjust equipment for spraying Can apply appropriate coats at correct consistency and proper paint thickness to get coverage with smooth application Can clean equipment for storage or reuse
SKILL/PROCESS:	1. Prepare vehicle for color coat and attach ground 2. Select and mix paint 3. Set up, clean, and adjust spray equipment 4. Tack surfaces 5. Apply color coats as needed tacking between coats 6. Apply clear coat as required 7. Clean equipment 8. Remove masking 9. Cure paint thoroughly 10. Light sand paint 11. Compound and buff 12. Clean vehicle
KNOWLEDGE/THEORY:	1. Knows methods of cleaning vehicle and paint booth 2. Knows how to use mild solvents to remove contaminants 3. Knows methods of attachment of ornaments, script, antenna and windshield wipers and how to carefully remove and store (pieces to be stored in car) 4. Knows methods of wet or dry sanding - abrasives, block sanding, hand sanding and power sanding, and how to protect moldings, bumpers, etc. 5. Knows use of sanding papers and techniques of block sanding and power sanding 6. Knows proper methods to use in rust prevention and preparation of surface a. Steel b. Aluminum c. Galvanized metal d. Fiberglass e. Plastic 7. Knows how to apply primer-surfacer or primer-sealer 8. Knows how to prepare car for painting 9. Knows paint mixing procedures 10. Knows proper procedures for applying paint

11. Knows how to clean the spray gun
12. Knows proper precautions to take in removing masking paper
13. Knows how to sand and compound area
14. Knows procedures to follow in cleaning the car

**VALUE/ATTITUDE
CONCEPTS:**

Understands and appreciates the importance of cleanliness, proper preparation, reducing trash and contamination, to assure that finished work will be satisfactory to the customer

TASK AREA:	Painting
TASK #17:	Applies an overall enamel finish
COMPETENCY:	Apply an overall enamel finish that is commercially acceptable on a conventional vehicle
CRITERION:	Can identify paint by code Can mix paint to correct consistency for application Can apply enamel finish with correct number of coats to obtain original color without runs, sags, or "orange peel"
SKILL/PROCESS:	1. Prepare vehicle for color coat 2. Select and mix paint 3. Set up, clean, and adjust spray equipment 4. Tack surfaces 5. Apply color coats as needed 6. Apply clear coat as required 7. Clean equipment 8. Remove masking 9. Cure paint thoroughly 10. Clean vehicle
KNOWLEDGE/THEORY:	1. Knows paint formulation by code, compatible materials to use with topcoats, reducers, catalysts, sealers, etc. 2. Knows how to use detergents properly and how to wash the surface and clean the paint booth 3. Knows how to use mild solvents to remove contaminants 4. Knows methods of attachment for ornaments, scripts, antenna, and windshield wipers 5. Knows methods of sanding - wet or dry sanding, use of abrasive papers, block sanding, power sanding 6. Knows methods of rust prevention and surface preparation of bare metal, steel, aluminum, galvanized metal and fiberglass 7. Knows how to apply and sand primer-surfacer 8. Knows how to clean primer-surfacer after sanding 9. Knows how to use masking papers and techniques of use 10. Knows how to apply primer-sealer 11. Knows how to apply enamel 12. Knows how to clean spray gun 13. Knows how to remove masking 14. Knows procedures to carry out in cleaning

**VALUE/ATTITUDE
CONCEPTS:**

Understands and appreciates the importance of cleanliness, proper preparation, reducing trash and contamination, to assure that finished work will be satisfactory to the customer

TASK AREA:	Painting
TASK #18:	Spot blends a lacquer finish
COMPETENCY:	Spot blend a lacquer finish and correctly match color with adjacent surfaces so the spot finish is not detectable
CRITERION:	Can identify paint and color by code and mix to match original color Can spray paint to blend with existing color so there are no differences detectable by the customer
SKILL/PROCESS:	1. Prepare vehicle for topcoat 2. Compound blend area 3. Solvent clean panel 4. Mask areas to be protected 5. Select and mix topcoat and blend material 6. Select, clean, and adjust spray equipment 7. Tack surface 8. Spray blend material 9. Apply color coats as needed, tacking and blending before each coat 10. Apply final blending coat 11. Clean equipment 12. Allow to dry 13. Remove masking 14. Light sand 15. Compound and buff 16. Clean vehicle
KNOWLEDGE/THEORY:	1. Knows procedures to carry out in cleaning area to be painted and blended 2. Knows how to check paint formulation by color and how to order lacquer paint for spot painting both lacquer and enamel 3. Knows sanding techniques, how to use abrasive papers, and tapering 4. Knows how to cover areas not to be painted and how to reverse masking to prevent sharp edges 5. Knows how to treat bare metal with proper conditioner and clean blend area with wax and grease remover 6. Knows how to apply primer-surfacer or primer-sealer 7. Knows how to sand primer-surfacer and compound blend area 8. Knows how to clean before painting 9. Knows how to prepare paint and blending materials 10. Knows how to apply paint and blend with existing finish 11. Knows how to clean spray gun

12. Knows how to remove masking
13. Knows how to compound and buff
14. Knows how to clean up

VALUE/ATTITUDE
CONCEPTS:

Understands the importance of matching colors so customer is satisfied

TASK AREA: Welding

TASK #19: Welds sheet metal with the oxyacetylene welding process

COMPETENCY: Weld various thickness of auto body metal with the oxyacetylene welding process to form a structurally sound bond that can be smoothed and prepared for finishing

CRITERION: Can use the oxyacetylene torch to weld auto body metal so bond is structurally sound and can be prepared for finishing
Can use the oxyacetylene equipment safely
Can adjust equipment for correct welding application

SKILL/PROCESS:

1. Prepare metal for welding
2. Set up material and check safety equipment
3. Select equipment, set up, and adjust pressure
4. Light torch and fusion weld joint
5. Close down equipment
6. Clean weld joint

KNOWLEDGE/THEORY:

1. Knows safety practices and how to use safety equipment
2. Knows how to set up and adjust welding equipment
3. Knows how to clean and prepare joint for welding
4. Knows how to select proper tip
5. Knows how to adjust pressures
6. Knows how to light torch and adjust flame
7. Knows how to weld joint
8. Knows how to shut down and store equipment
9. Knows how to clean weld

VALUE/ATTITUDE CONCEPTS: Understands and appreciates the importance of following safety practices and procedures in welding

TASK AREA:	Welding
TASK #20:	Flame cuts metal with the oxyacetylene cutting process
COMPETENCY:	Flame cut metal with oxyacetylene process without damage to adjacent parts following safe practices
CRITERION:	Can prepare for safety and protection of adjacent parts for cutting Can select equipment and adjust properly for material to be cut Can cut without damage to adjacent parts
SKILL/PROCESS:	1. Prepare metal for cutting in safe environment 2. Prepare safety protection processes 3. Select tips; set up and adjust equipment 4. Light torch and make cut 5. Close down and store equipment 6. Cool material 7. Clean material and area
KNOWLEDGE/THEORY:	1. Knows safety procedures and how to use safety equipment 2. Knows how to set up equipment 3. Knows how to select proper tip 4. Knows how to adjust pressures 5. Knows how to light torch and adjust 6. Knows how to protect components from fire damage 7. Knows how to make cuts 8. Knows how to shut down and store equipment 9. Knows how to handle hot materials
VALUE/ATTITUDE CONCEPTS:	Understands the importance of safety practices and procedures in flame cutting and handling oxyacetylene cutting equipment

TASK AREA:	Welding
TASK #21:	Welds heavy gauge metal with the arc welding process
COMPETENCY:	Weld heavy gauge metal with the arc welding process so the weld joint is structurally sound and the appearance is acceptable
CRITERION:	Can clean and prepare parts for welding Can set up electric arc welding equipment for welding Can select correct electrodes for type and thickness of metal Can weld parts together with a structurally sound weld Can follow safety practices and provide protection for equipment and people during the welding process
SKILL/PROCESS:	1. Prepare metal for welding 2. Set up metal and secure 3. Select electrodes and set amperage 4. Put on safety and protective equipment 5. Weld joint 6. Turn off welder and store equipment 7. Clean weld
KNOWLEDGE/THEORY:	1. Knows how to select arc welding equipment - Polarity (1) AC or DC (2) Various types (3) Advantages/disadvantages (4) Electrodes 2. Knows how to select proper amperage a. Metal thickness b. Electrode diameter 3. Knows how to select proper safety equipment 4. Knows how to arc weld
VALUE/ATTITUDE CONCEPTS:	Understands the importance of safety practices and procedures in using arc welding equipment Understands and appreciates the importance of making structurally sound weld joints.

TASK AREA:	Welding
TASK #22:	Welds auto metals with spot welding process
COMPETENCY:	Weld auto body metal panels with spot welding process so the panel is in proper alignment and the joint is as strong as the original joint and neat and acceptable in appearance
CRITERION:	Can prepare panels by properly cleaning Can select and set up equipment for spot welding Can align panels to assure proper clearances and strong weld joints Can weld joint so appearance is acceptable Can follow safety practices to protect people and equipment
SKILL/PROCESS:	1. Prepare metal for welding 2. Select welding process and safety equipment 3. Put on safety and protective equipment 4. Set up and adjust equipment 5. Spot weld metal joint 6. Close down and store equipment 7. Clean metal
KNOWLEDGE/THEORY:	1. Knows how to select and use proper safety equipment and to follow safety procedures a. Eye protection (1) Dark glasses for arc spot and MIG (2) Safety goggles or face shield for resistance welding b. Protection against electrical shocks and burns c. Fire prevention procedures 2. Knows correct preparation procedures for welding a. Aligning (1) Measuring (2) Cutting (3) Fitting b. Type of joints (1) Lap (2) Recessed lap - use of crimping tool c. Cleaning joints d. Methods of securing for welding 3. Knows how to select and prepare equipment and how to set up for metal thickness
VALUE/ATTITUDE CONCEPTS:	Understands the importance of following all safety practices and the safe use of equipment in spot welding and the importance of making structurally sound welds

TASK AREA:	Welding
TASK #23:	Welds metals with the metallic inert gas (MIG) process
COMPETENCY:	Weld auto body metal with the metallic inert gas process so that weld is structurally sound and appropriately neat in appearance
CRITERION:	Can set up metallic inert gas equipment to assure proper use and correct safety procedures Can prepare metal by cleaning and/or grinding to assure the correct fit and that weld is structurally sound
SKILL/PROCESS:	1. Prepare metal for welding 2. Set up and adjust equipment 3. Put on safety equipment and protective devices 4. Weld metal 5. Close down and store equipment 6. Clean metal
KNOWLEDGE/THEORY:	1. Knows safety practices and procedures 2. Knows how to check and set up equipment 3. Knows how to prepare metal for welding 4. Knows how to select and use protective equipment and devices for welding 5. Knows how to set up welder and make adjustments 6. Knows how to make structurally sound weld 7. Knows how to shut down equipment and store
VALUE/ATTITUDE CONCEPTS:	Understands the importance of safety practices and procedures in using metallic inert gas welding equipment Understands and appreciates the importance of making structurally sound weld joints

TASK AREA:	Welding
TASK #24:	Brazes sheet metal with the oxyacetylene welding process
COMPETENCY:	Braze sheet metal with the oxyacetylene welding process to assure a smooth and structurally sound weld
CRITERION:	Can prepare metal by cleaning and fitting to assure metals will bond Can select proper equipment and tip sizes and adjust pressures for proper heat Can follow proper safety procedures in setting up equipment and welding
SKILL/PROCESS:	1. Prepare metal for brazing 2. Set up and secure metal in safe environment 3. Select tips, set up equipment, and adjust 4. Select filler rods 5. Put on safety equipment and protective devices 6. Light torch and braze metal 7. Close down and store equipment 8. Clean metal
KNOWLEDGE/THEORY:	1. Knows safety practices and procedures 2. Knows how to prepare metal for welding 3. Knows how to select and use safety equipment and devices 4. Knows how to set up welder and adjust to correct pressures for welding 5. Knows how to select proper welding rods and flux 6. Knows how to make structurally sound weld by brazing 7. Knows how to purge welder and store equipment
VALUE/ATTITUDE CONCEPTS:	Understands and appreciates the use of brazing as a technique for bonding metals

TASK AREA:	Metalworking
TASK #25:	Fills with body solder
COMPETENCY:	Prepare a smooth, even surface conforming to the original body contour with body solder
CRITERION:	Can prepare metal surfaces for proper adhesions of solder to metal Can select correct solder and apply using correct heating methods and preventing heat damage to other body components Can shape solder to general contour of surface while applying solder Can file with body file and sand with correct abrasive to prepare a smooth surface for neutralizing Can neutralize surfaces with correct chemical agent
SKILL/PROCESS:	1. Select equipment and materials 2. Clean and prepare metal for tinning 3. Tin area of metal 4. Apply and paddle solder to build up 5. Cool solder 6. File and sand to proper contour 7. Neutralize solder area 8. Clean up and store materials and equipment
KNOWLEDGE/THEORY:	1. Knows how to rough straighten damaged area and smooth and grind or file a. File techniques b. Grinding methods, type of discs, grit sizes, use of pull rods c. Safety precautions d. Cold shrink and hot shrink methods e. Remove all paint, rust, tar and grease from area to be filled 2. Knows procedure for tinning a. Cleaning surface b. Types of solder (1) 40/60 (2) 30/70 (3) 20/80 c. Using acid etching agents d. Application of tinning compounds e. Tinning tools and procedures 3. Knows how to fill solder a. Heating tools (1) Gas torches (2) Electric tools b. Use of wooden paddle and beeswax c. Puddling techniques d. Control of heat to prevent buckling

4. Knows how to file and featheredge
 - a. Types of files
 - b. Filling techniques
 - c. Tapering edges
 - d. Final sanding, sandpapers and techniques
5. Knows proper primer-surfacer application procedures

VALUE/ATTITUDE
CONCEPTS:

Understands and appreciates the use of body solder for specialized filling to achieve most effective restoration

TASK AREA:	Metalworking
TASK #26:	Fills with body plastics
COMPETENCY:	Fill damaged body areas with body plastics to conform to the original body contour with a smooth even surface without pin holes and with sand scratches no more than eighty grit.
CRITERION:	Can check body panel to assure that panel can be returned to original body contour with less than one quarter inch thickness of body plastics on finished surface Can clean and prepare surface to assure adhesion of body plastics Can mix and apply body plastics to conform to general contour of original panel surface Can finish to proper contour by filing and sanding plastics to exact contour and without pin holes and sand scratches of no more than eighty grit and plastic is feathered to metal
SKILL/PROCESS:	1. Prepare metal 2. Select equipment and materials 3. Mix and apply filler 4. Clean equipment 5. File hardened filler to contour 6. Sand smooth and featheredge to exact contour 7. Clean
KNOWLEDGE/THEORY:	1. Knows safety procedures while working with plastics 2. Knows procedures for preparation of damaged metal a. Cleaning chemically b. Roughing out area 3. Knows different types of fillers and their application a. Plastic fillers mixing and application b. Metallic fillers mixing and application c. Uses of tools and their use d. Safety precautions 4. Knows how to finish area a. Tools and their use, abrasives b. Primers and blocking c. Glazing
VALUE/ATTITUDE CONCEPTS:	Understands and appreciates the use of body plastics in restoring to original contour and the condition under which body plastics are most effective and acceptable Understands and follows safety practices to protect self and others when working with body plastics

TASK AREA:	Estimating
TASK #28:	Analyzes damaged area
COMPETENCY:	Analyze the damaged area and make an accurate assessment and plan for repairing the damage
CRITERION:	Can visually check components of body to determine types of damage and possible related damage Can determine components to be checked for damage with measuring tools and instruments Can determine components to be replaced and/or repaired Can determine correct repair methods and procedure to return body to acceptable condition
SKILL/PROCESS:	1. Clean vehicle 2. Position vehicle to have visual access to all components 3. Identify all components showing visual damage 4. Remove parts as necessary to inspect for hidden damage 5. Measure and gauge to determine misalignment and distorted components 6. Determine which parts are to be replaced 7. Determine components to be repaired and select appropriate repair procedure
KNOWLEDGE/THEORY:	1. Knows extent of damage and direction of impact 2. Knows how to obtain and use specifications 3. Knows how to determine parts which need replacing 4. Knows how to determine parts which need repair 5. Knows the proper use of gauges 6. Knows the proper use of a tape measure
VALUE/ATTITUDE CONCEPTS:	Understands the importance of thoroughly and accurately analyzing damaged areas so restoration can be accomplished in the most effective, efficient, and least expensive manner to return vehicle to condition satisfactory to customer

TASK AREA:	Metalworking
TASK #29/30/31:	Prepares damaged panel for straightening or filling, roughs out damaged area, and shrinks stretched metal
COMPETENCY:	Prepare damaged panel for straightening or filling by roughing out panels to align and return to general body contour and making sure that body panels fit and operate correctly
CRITERION:	Can determine correct method and procedure for repairing panel Can select and set up equipment for pushing and/or pulling panels safely Can push or pull panels applying appropriate forces, and heat to align and return panel to general body contour Can shrink metal by using heat, hand tools, and cooling methods to return metal to general body contour
SKILL/PROCESS:	1. Clean panel 2. Analyze damage and determine method of roughing out 3. Select equipment 4. Set up equipment and anchor vehicle 5. Apply corrective forces and controlled heat to bring in to proper alignment 6. Rough out panel to general contour with hand tools 7. Shrink high spots to contour 8. Finish metal for filling
KNOWLEDGE/THEORY:	1. Knows how to clean and set up vehicle for work 2. Knows how to analyze damage a. Direct or indirect damage b. Direction of the impact c. Repair or replace d. Related damage e. Buckles, rolls, creases and dents 3. Knows techniques of roughing out for major repairs Realignment tools and their use (1) Hydraulic jack and ram (2) Hand winch (3) Tiedown methods (4) Clamps 4. Knows techniques of roughing out for minor repairs Methods and tools (1) Hammers, dollies, spoons (2) Dent pullers, pull rods (3) Shrinking (4) Grinding and filing (5) Vacuum pullers and slapper files (6) Straightedge

**VALUE/ATTITUDE
CONCEPTS:**

Understands the importance of determining proper methods of repair and selecting the appropriate tools and equipment for efficiently roughing out to restore damaged sheet metal to the appropriate contour for filling and finishing

Understands and effectively follows practices in using equipment for roughing out

TASK AREA:	Metalworking
TASK #32:	Files and picks sheet metal to straighten
COMPETENCY:	Files and picks sheet metal to straighten to original contour so flaws are not visually detectable
CRITERION:	Can select and use straightening tools in safe manner to return sheet metal to original body contour so flaws are not visually detectable
SKILL/PROCESS:	1. File to determine low and high spots 2. Shrink high spots 3. Pick up low spots 4. Finish metal for undercoat
KNOWLEDGE/THEORY:	1. Selects proper tools for repair 2. Knows how to properly use grinder and file for removal of paint and rust 3. Knows how to hammer high metal down 4. Knows how to pick up low metal 5. Knows how to properly use the file to locate high and low place and smooth surface 6. Knows how to shrink high places 7. Knows how to condition bare metal with metal conditioner and prime
VALUE/ATTITUDE CONCEPTS:	Understands the importance of performing the task of repairing small dents with customer satisfaction as the major objective

TASK AREA:	Painting
TASK #34:	Sands surface with abrasive material and equipment in preparation for topcoat
COMPETENCY:	Sand surfaces with correct abrasive material and equipment so that surface will match original contours and surface scratches are no coarser than largest sand scratch recommended for the type of topcoat to be applied
CRITERION:	Can select proper procedure and abrasive materials for sanding surface Can safely use sanders and sand surface without removing excessive metal so sand scratches are no coarser than largest sand scratch recommended for the type of topcoat to be applied
SKILL/PROCESS:	1. Identify proper abrasives by grit size for machine sanding 2. Select machine sanding equipment 3. Secure correct grit size abrasive to sander 4. Put on safety and protective equipment and devices 5. Rough sand surfaces with coarse grit paper 6. Sand with medium grit paper 7. Select hand sanding materials 8. Final sand with correct grit for topcoat
KNOWLEDGE/THEORY:	1. Knows different types of coated abrasives a. Aluminum oxide b. Silicon carbide c. Backings d. Coatings e. Open and closed 2. Knows different types of sanding a. Power b. Hand (1) Wet (2) Dry c. Rough d. Finish 3. Knows when and where to use different abrasives and methods 4. Knows when sanding is complete 5. Knows how to clean vehicle for primer-surfacer
VALUE/ATTITUDE CONCEPTS:	Understands the importance of economic and efficient selection and use of materials in sanding Understands the proper and safe use of equipment to avoid damage to chrome, trim, glass and adjoining surfaces

TASK AREA:	Fiberglass
TASK #35:	Repairs fiberglass panel, scratches, gouges, and cracks
COMPETENCY:	Repair scratches and gouges in fiberglass panels using correct tools and materials so that panel is structurally sound and surface is smoothed for undercoat
CRITERION:	Can clean and prepare both surfaces using correct chemicals Can remove paint by sanding Can sand surfaces with correct abrasive to taper and remove loose particles to provide a surface which can be built up to original body contour Can reinforce cracks to assure correct structural strength Can fill surfaces with appropriate amount of epoxy filler so surfaces can be sanded to original body contour Can sand surfaces to original body contour using proper abrasives and safety procedures to assure sand scratches are appropriate to type of finish to be applied
SKILL/PROCESS:	1. Clean surfaces 2. Remove old paint 3. Rough sand area on both sides 4. Taper area to be repaired 5. Mask area to be protected 6. Reinforce broken and cracked area on underside 7. Fill area with fiberglass filler 8. Let cure 9. Sand to proper body contour
KNOWLEDGE/THEORY:	1. Knows safety procedures for working fiberglass 2. Knows how to identify tools and materials for repair of fiberglass 3. Knows when and where to use materials and tools 4. Knows how to clean and prepare area for repair 5. Knows how to prepare joint by removing loose particles and tapering 6. Knows how to secure panels in position for repair 7. Knows how to cut and prepare reinforcing strips 8. Knows how to attach reinforcing strip to panel and cure 9. Knows how to remove clamps and holding devices

10. Knows how to mix filler and fill to proper contour
11. Knows how to cure filler
12. Knows how to file and sand filled areas to correct contour and finish for undercoat

**VALUE/ATTITUDE
CONCEPTS:**

Understands and appreciates the importance of following safety practices and procedures in working with fiberglass

TASK AREA:	Fiberglass
TASK #36:	Removes and replaces fiberglass panel
COMPETENCY:	Remove and replace a fiberglass panel using correct tools and materials to remove damaged panel and to fit and bond new panel to original body contours
CRITERION:	Can determine amount of panel to be removed and for lap in joining of panels Can clean panel with appropriate cleaners Can remove damaged panel using proper safety procedures and equipment Can prepare joints by sanding to taper for fitting of panel replacement Can cut partial replacement panel to fit so reinforcing and filling can be completed to return panel to original contour and is structurally sound Can fit in new panel by aligning, securing, and bonding to existing body panel for a structurally sound bond Can finish panel and joints to original body contours with no pin holes and sand scratches so surface is appropriate for finish to be applied
SKILL/PROCESS:	1. Mark maximum panel area to be removed 2. Clean panel 3. Cut panel 4. Remove paint from area 5. Taper edges 6. Cut and fit repair panel 7. Secure panel in position 8. Reinforce underside at joint of panels 9. Cure reinforced joints 10. Remove devices used to hold panel in position 11. Fill area 12. Cure 13. Sand to original contours 14. Apply refinisher undercoats 15. Sand undercoats and feather 16. Finish with topcoats to blend with original finish
KNOWLEDGE/THEORY:	1. Knows safety procedures for working fiberglass 2. Knows how to identify tools and materials for repair of fiberglass 3. Knows when and where to use materials/tools 4. Knows how to clean and prepare area for repair 5. Knows how to mark and remove damaged panel 6. Knows how to prepare edge of panel for joining to replacement panel 7. Knows how to fit replacement panel in position

8. Knows how to secure panels in position for repair
9. Knows how to cut and prepare reinforcing strips
10. Knows how to attach reinforcing strip to panel and cure
11. Knows how to remove clamps and holding devices
12. Knows how to mix filler and fill to proper contour
13. Knows how to cure filler
14. Knows how to file and sand filled areas to correct contour and finish for undercoat

VALUE/ATTITUDE
CONCEPTS:

Understands the importance of following safety practices and correct procedures in replacing fiberglass panels

TASK AREA:	Glass and Trim
TASK #37:	Installs movable glass
COMPETENCY:	Install movable glass without damage to automobile surfaces and upholstery, securing glass so there are no leaks or wind noises and glass units operate smoothly
CRITERION:	Can remove hardware and trim without damaging Can remove old glass and prepare channels and guides for new glass Can check and align channel and mechanisms to assure proper fits and/or operation Can select the correct glass Can secure glass using appropriate securing devices, retainers, or glues Can align glass for proper fit to make weather-proof Can check power window unit mechanism for proper operation and repair or replace unit so unit operates properly Can install trim so that trim fits properly and mechanisms operate smoothly
SKILL/PROCESS:	1. Identify and obtain replacement glass 2. Obtain service information 3. Obtain tools 4. Remove trim and hardware 5. Remove old glass and clean channels of any broken particles 6. Check, adjust, or repair regulators 7. Lubricate 8. Secure new glass in mounting tracks 9. Check for proper movement and alignment of door 10. Adjust glass for proper fit and operation 11. Replace trim 12. Check for leaks 13. Clean glass and trim
KNOWLEDGE/THEORY:	1. Knows how to use service manuals 2. Knows how to check for door alignment 3. Knows to wear gloves and goggles when cleaning up broken glass 4. Knows trim and hardware that needs to be removed a. Special tools needed b. Handles c. Arm rests d. Trim pads e. Remote mirrors f. Power window and seat switches g. Courtesy and marker lamps h. Water shields

5. Knows how to identify different types of glass
 - a. Nags patterns
 - b. Type
 - (1) Laminated
 - (a) Safety sheet
 - (b) Safety plate
 - (2) Solid tempered
 - c. Tint
 - (1) Clear
 - (2) Tinted
 - (3) Shaded
 - (4) Colored
6. Knows methods of removing, replacing, and aligning vent window assembly
 - a. Removal and replacement of assembly in door
 - b. Adjusting procedures
 - c. Replacing glass in frame
 - d. Vent regulators
 - (1) Adjustments
 - (2) Repairs
 - (3) Lubrication
 - e. Adjusting opening effort on friction type
 - f. Mini vents
7. Knows methods of removing, replacing, and aligning glass
 - a. Methods of removal
 - b. Lower sash channel
 - (1) Press on - glass type
 - (2) Bolt on - check torque
 - (3) Plastic retainers
 - (4) Epoxy - Ford
 - c. Travel stops
 - (1) Up stops
 - (2) Down stops
 - d. Run channels
 - (1) Removing and replacing
 - (2) Adjusting
 - e. Guides
 - (1) Channels and rollers
 - (2) Adjustable guide plates
 - (3) Bars or tubes
 - (a) Single bar
 - (b) Double bar
 - f. Inner panel cam
 - Adjustment for tilt
8. Knows how to check regulators for:
 - a. Wear and stripped teeth
 - b. Loose rivets
 - c. Bent arms
 - d. Damaged rollers
 - e. Missing and broken springs
9. Knows proper methods of checking and replacing power window motors
 - a. Power source
 - (1) Battery
 - (2) Wiring and connectors

- (3) Relays and breakers
 - (4) Switches
- b. Motors
 - (1) Checking motors
 - (2) Safe replacement
- 10. Knows how to lubricate
 - a. Regulators
 - b. All rollers, guides, and tracks
 - c. Inner panel cam
 - d. Lower sash channel roller track
 - e. All pivot bolts or rivets
- 11. Knows how to determine locations for adjusting glass
 - a. In and out
 - b. Front and rear
 - c. Level
 - d. Height
- 12. Knows methods of testing for water and dust leaks
- 13. Knows methods of testing for wind noise and air leaks
- 14. Knows how to clean glass and trim

VALUE/ATTITUDE
CONCEPTS:

Understands importance of keeping trim clean, handling carefully, and cleaning up glass when installed

TASK AREA:	Glass and Trim
TASK #38:	Installs stationary glass
COMPETENCY:	Installs stationary glass without damage to automobile surfaces or moldings, securing glass and molding safely, properly, and without leaks or wind noises
CRITERION:	Can remove trim and moldings safely and without damage to other components of the automobile Can clean glass opening, pinch weld, and clean weatherstrip Can select the correct replacement glass and materials for installation and securing Can install glass according to manufacturer's procedures, aligning properly and weather sealing Can leak test to assure no water leaks Can replace trim and clean properly
SKILL/PROCESS:	1. Select correct glass 2. Look up service information and secure tools 3. Clean up broken glass 4. Protect adjoining parts 5. Remove parts as required to gain access to glass 6. Remove glass - weatherstrip type 6A. Remove glass - adhesive bonded type 7. Clean pinch weld and weatherstrip 7A. Install glass - adhesive bonded type 8. Check glass opening 9. Apply sealer - body to weatherstrip 10. Apply sealer - glass to weatherstrip 11. Install glass - weatherstrip type 12. Leak test - all models 13. Reinstall all parts 14. Clean up
KNOWLEDGE/THEORY:	1. Knows how to check service manual for specific car 2. Knows to wear gloves and goggles while working with glass 3. Knows to cover hood, fenders, dash, etc. to protect areas while working 4. Knows how to gain access to glass a. Special tools needed (1) Wiper arms (2) Air vent screen (3) Washer nozzles (4) Reveal moldings (5) Garnish moldings (6) Sun visors

- (7) Rear view mirror
Transfer bonded mirror support, if necessary
- (8) Disconnect and protect antenna and defroster wires
- 5. Knows how to select correct glass
 - a. Nags patterns
 - b. Antenna in windshield
 - c. Heated glass
 - d. Types of glass
 - (1) Laminated safety
 - (2) Solid tempered
 - e. Types of tint
 - (1) Clear
 - (2) Tinted
 - (3) Shaded
 - (4) Colored
- 6. Knows how to remove glass - weatherstrip type
 - a. Special tools needed
 - b. Types of weatherstrip
 - (1) Solid weatherstrip
 - (2) Removable locking strip
 - (3) Locking strip made in weatherstrip
- 7. Knows how to install glass - weatherstrip type
 - a. Special tools needed
 - b. Sealers
 - c. Cleaning
 - d. Reveal moldings
- 8. Knows how to remove glass - adhesive bonded type
 - a. Special tools needed
 - b. Types of adhesive
 - c. Cutting adhesive and removing glass
- 9. Knows how to install glass - adhesive bonded type
- 10. Knows how to leak test all models
 - a. Methods
 - b. Precautions
- 11. Knows how to reinstall parts
 - a. Reveal moldings
 - (1) Mark location of clips
 - (2) Replace moldings carefully; do not bend
 - b. Vent screen
 - c. Washer hoses
 - d. Wipers
 - Check for proper operation
 - e. Garnish moldings
 - f. Sun visors
 - g. Rear view mirror
- 12. Knows proper clean up procedures

**VALUE/ATTITUDE
CONCEPTS:**

Values importance of protecting owner's car, inside and out, to prevent damage and keep clean

TASK AREA:	Metalworking
TASK #39:	Installs and aligns door
COMPETENCY:	Install and align door to assure correct clearances of door to body and that door opens, closes, fastens securely, and has no leakage or wind noise
CRITERION:	Can remove door safely and without damaging body Can select proper replacement door Can follow proper procedures to reinstall door on hinges Can align door by shifting and adjusting hinges and mechanisms so door fits within opening with uniform spacing around door, aligned with other body panels; is weather/wind proof; and operates smoothly Can install glass and trim
SKILL/PROCESS:	1. Inspect visually to identify damaged components 2. Remove trim and glass as needed for access 3. Remove door 4. Check all components for damage 5. Replace damaged components 6. Secure replacement door 7. Check and align body opening 8. Refinish interior areas of replacement door 9. Install and align door to body 10. Adjust door latch 11. Install glass 12. Install weatherstripping 13. Install trim 14. Finish door to match 15. Check for leaks and wind noises 16. Clean
KNOWLEDGE/THEORY:	1. Knows how to recognize damage a. Missing parts b. Worn parts c. Bent parts d. Broken parts e. Rusty parts f. Loose parts 2. Knows how to clean and lubricate a. Cleaning solvents used b. Lubricants 3. Knows how to remove and replace trim pads a. Special tools b. Arm rests c. Inside handles d. Trim pad retainers - clips and screws e. Remote mirrors f. Power window and seat switches

- g. Courtesy and marker lamps
- h. Water shields
- 4. Knows how to replace and adjust components
 - a. Movable hinges
 - (1) Special tools (S wrenches, etc.)
 - (2) How to adjust
 - (a) If the hinge bolts to the outside of the pillar the door may be moved front or rear at the pillar. If it bolts to the rear of the pillar, the movement will be in and out
 - (b) If the hinge bolts to the edge of the door, the movement will be in and out. If it bolts to the inside of the door, the movement will be to the front and rear
 - (c) Some up and down movement may usually be obtained at both ends of the hinge
 - b. Bolted on non-adjustable hinges
 - (1) To move door rearward, open or spread hinges by blocking between hinge and pushing closed on door
 - (2) To move door forward, remove hinge and squeeze together
 - c. Welded on hinges
 - (a) To move door to the rear, block between hinge and push closed on door
 - (b) To move the door to the front remove the hinge pins and remove the door from the car. Drive hinges into the pillar and door with hammer and block of wood to avoid damage to paint. (Check bushings and replace if they are worn.)
- 5. Knows function of door stops - prevent door opening too wide
- 6. Knows function of door checks - hold door in open position
- 7. Knows function of stricker plates and bolts
 - a. Special tools needed
 - b. Caged plates
 - c. Dovetails and receptacles
- 8. Knows types of locks, how to inspect, how to lubricate
- 9. Knows types of lock cylinders and linkage
- 10. Knows how to inspect and lubricate controls and linkage
 - a. Remote controls
 - b. Power locks
 - (1) Electric
 - (2) Vacuum
- 11. Knows how to install rubber bumpers
- 12. Knows how to inspect and lubricate weatherstripping
- 13. Knows how to remove and replace weatherstripping

- a. Special tools needed
 - b. Retainers
 - c. Adhesives
 - d. Adhesive removers
 - e. Use of heat
14. Knows how to remove and replace outside handles
- a. Tools
 - b. Retainers
 - c. Linkage
 - d. Adjusting
15. Knows how to test for water leaks, rattles, and wind noise
- a. How to conduct road test for noise
 - b. Methods of leak testing

VALUE/ATTITUDE
CONCEPTS:

Understands and appreciates the effects of proper fitting and operation of the doors as it concerns safety, appearance, and elimination of noise for customer satisfaction

TASK AREA: Metalworking

TASK #39A: Installs and aligns deck lid

COMPETENCY: Install and align deck lid so lid is centered in opening, operates smoothly, fastens securely, and is weatherproof

CRITERION:

- Can remove deck lid safely and without damaging body
- Can select proper replacement deck lid
- Can follow proper procedures to install deck lids so lid is aligned with uniform spacing in opening and lock and hinge mechanisms operate smoothly
- Can check deck to assure deck lid weatherseals when closed
- Can check and repair automatic deck lid opener

SKILL/PROCESS:

1. Inspect and identify damaged components
2. Select replacement components
3. Drill holes for any components
4. Refinish underside of replacement lid
5. Transfer lock assembly
6. Install on hinges and align
7. Leak test and adjust if necessary
8. Refinish to color match
9. Install trim and ornamentation

KNOWLEDGE/THEORY:

1. Knows how to replace and adjust locks and strikers
 - a. Service manual as reference
 - b. Lubrication
 - c. Adjustments
 - (1) Up and down
 - (2) Side to side
 - d. Cylinders and linkage
 - e. Mechanical pull down units
 - f. Deck lid release units
 - (1) Vacuum
 - (2) Electric
2. Knows how to replace and adjust hinges
 - a. Lubrication
 - b. Adjustments
 - (1) Front and rear
 - (a) Slotted holes
 - (b) Caged plates
 - (2) Side to side
 - (a) Slotted holes
 - (b) Bending
 - (3) Up and down
 - (a) Adjustable hinge box
 - (b) Adjustable hinge strap at lid
 - (c) Bending hinge straps
 - (d) Adjusting with shims

3. Knows how to replace and adjust torsion bars
 - a. Special tools needed
 - b. Proper adjustments (tighten to increase ability to hold lid in open position. Loosen to decrease the amount of effort required to close lid)
4. Knows how to remove and replace weatherstripping
 - a. Adhesive removal
 - b. Adhesives and cleaners
 - c. Checking contact
5. Knows proper methods of leak testing

VALUE/ATTITUDE
CONCEPTS:

Understands and appreciates the effects of proper fitting and operation of the deck lid as it concerns safety, appearance, and elimination of noise for customer satisfaction

TASK AREA:	Metalworking
TASK #40:	Aligns body shell
TASK #63:	Utilize lifting equipment
COMPETENCY:	Align body shell to return body alignment to original body contours so that doors, glass, and deck lid fit and operate correctly
CRITERION:	Can clean body shell to prepare for alignment Can diagnose body misalignment by comparative measuring Can determine parts to be removed and remove without further damage Can set up procedure for aligning Can select correct equipment for aligning Can set up equipment and secure body shell and equipment for alignment Can use equipment to apply forces to bring body shell into alignment Can check dimensions using measuring instruments to check alignment
SKILL/PROCESS:	1. Clean and prepare body shell for alignment 2. Diagnose alignment needs 3. Remove all components that will interfere with alignment equipment 4. Determine equipment needed for application of force 5. Secure body on equipment 6. Select alignment equipment 7. Set up equipment and fasten to body shell 8. Apply forces and heat to correct misalignment 9. Remove equipment 10. Reinstall components
KNOWLEDGE/THEORY:	1. Knows proper cleanup procedures a. Exterior cleanup (clean off mud, oil, etc.) b. Interior cleanup (clean up dirt, broken glass, etc., before it damages interior trim) 2. Knows disassembly procedures a. Safety procedures b. How to protect exterior c. Remove exterior moldings, glass, etc., that will interfere with repair work and store d. Remove interior trim and store in clean area

3. Knows misalignment problems
 - a. Visual inspection
 - b. Measuring tools needed
 - (1) Steel tape
 - (2) Tram gauge
 - c. How to measure
 - Body openings
 - (a) Cross-checking
 - (b) Comparing with undamaged side
 - (c) Comparing sides by measuring from center
4. Knows how to identify types of equipment
 - a. Portable jack and ram, 4-ton, 10-ton
 - b. Extensions and attachments
 - c. Clamps
 - d. Hoses and fittings
 - e. Fluid
 - f. Stationary equipment
5. Knows how to use appropriate equipment
 - a. Safety precautions involved
 - b. Theory of hydraulic operation
 - c. Push or pull reaction
 - d. Spring back and elastic limit
 - e. Clamping and securing
6. Knows alignment procedures to follow
 - a. Exercising correcting force in reverse order from which damage occurred
 - b. Using body jacks safely
 - (1) Methods of anchoring
 - (2) Clamps
 - (3) Multiple hookups
 - (4) Spreading force to avoid creating additional damage
 - c. Using pulling equipment safely
 - (1) Anchoring
 - (2) Clamps
 - (3) Chains
 - d. Proper use of heat on buckles

VALUE/ATTITUDE
CONCEPTS:

Understands the importance of accuracy in alignment to assure proper operation of vehicle when in operation

Understands the importance of following correct procedures and strict adherence to safety practices when using jacking and pulling equipment

TASK AREA:	Metalworking
TASK #41:	Installs rear clip
COMPETENCY:	Install a rear clip so that clip is aligned correctly and windows and deck lid fit correctly, are weather-proof, and all joints are structurally as strong as the original body
CRITERION:	Can set up automobile to secure and level car for work Can determine location of cut for removal of damaged component Can set up equipment and align components to be reused Can mark location of cut and cut clip to be removed Can check and straighten components to be reused and align to specifications Can fit replacement clip by cutting and grinding Can secure by proper methods and procedures and weld using proper welding processes for each component to be welded
SKILL/PROCESS:	1. Prepare car for repair 2. Remove and store all parts that will interfere with repair work 3. Determine best place to cut and join clip a. Inspect damaged car and used clip b. Locate joining points 4. Straighten and align pillars 5. Mark and cut clip 6. Separate old clip from car 7. Gauge and straighten frame on conventional vehicles 8. Prepare joints for welding a. Clean undercoating and body deadner b. Remove any burrs c. Clean all joints to be welded 9. Align the two sections 10. Weld the sections together 11. Tighten body bolts to proper torque 12. Finish welded joints 13. Reassemble and adjust components that have been removed 14. Refinish 15. Give final check a. Road test b. Leak test
KNOWLEDGE/THEORY:	1. Knows steps necessary in preparing car for repair

- a. Locating and leveling car in area to be repaired
 - b. Leaving room to disassemble
 - c. Locating used clip
 - d. Disconnecting battery
2. Knows methods of removing parts that will interfere with repair work
 - a. Glass
 - b. Door, if in the way
 - c. Interior trim, lights, and wiring
 - d. Brake lines, fuel lines, fuel tank and store gas in safe place
 - e. Bumpers
 - f. Cover dash, steering wheel, etc.
3. Knows best place to cut and join clip
 - a. Clip without roof
 - b. Clip with roof
4. Knows methods of straightening and aligning pillars
 - a. Methods of measuring
 - b. Methods of repairing
5. Knows methods of marking and cutting clip
 - a. Make measurements of all body openings
 - b. Recording measurements and scribing pillars
 - c. Cutting pillars
 - d. Locating rocker panel and floor pan cutting areas
 - (1) Joining floor pan
 - (2) Selecting and scribing location to cut rocker panels
6. Knows methods and procedures for separating old clip from car
 - a. Supporting roof panels
 - b. Removing rear clip
7. Knows methods of gauging and straightening frame on conventional vehicles
 - a. Methods of measuring and gauging frames
 - b. Frame straightening procedures
8. Knows how to prepare joints for welding
 - a. Cleaning area for welding
 - b. Fitting joints
9. Knows how to align the two sections
 - a. Fitting the two parts together
 - b. Clamping in place at pinch welds, at pillars and rocker panels
 - c. Checking alignment of all components
 - (1) Measuring and cross-checking
 - (2) Checking for level and square
 - d. Correcting any misalignment
 - e. Clamping securely
 - f. Checking body mounts for alignment and installing bolts
 - g. Bolting or riveting floor pan lap joint

10. Knows how to weld the sections together
 - a. Safety precautions
 - b. Spacing of joints
 - c. Welding materials
 - d. Process and procedure
 - e. Checking alignment during welding process
 - f. Type of weld at each joint
11. Knows how to finish welded joints
 - a. Cleaning joints on pillars and rocker panels
 - b. Filling exposed joints with body solder or plastic filler
 - c. Feathering and priming joints
 - d. Cleaning floor pan and sealing welded joint top and bottom
 - e. Refinishing joints and floor pan
 - f. Trimming out body
 - g. Undercoating as necessary
12. Knows how to reassemble
13. Knows how to clean up, sand, and refinish as necessary
14. Knows how to check for rattles, wind noise, and water leaks

VALUE/ATTITUDE
CONCEPTS:

Understands the importance of protecting non-damaged components

Understands the importance of careful planning in the removal and replacement of the "clip"

Understands the importance of proper alignment and structural strength in replacing clip

TASK AREA:	Metalworking
TASK #42:	Installs and aligns front sheet metal and panels
TASK #51:	Replaces radiators and radiator supports
COMPETENCY:	Install and align front sheet metal and panels so components are properly fastened and aligned and there are no squeaks or rattles
CRITERION:	Can remove damaged components following correct procedures Can select correct replacement components Can replace components in proper sequence so component is aligned and secured properly
SKILL/PROCESS:	1. Secure and level vehicle on work stands 2. Secure all replacement parts 3. Disassemble damaged sheet metal and components 4. Repair parts to be reused 5. Install parts and components according to procedures 6. Align components as assembled 7. Replace or repair damaged related parts 8. Refinish as required 9. Check for wind noise 10. Check all components for proper operation 11. Road test for rattles and squeaks 12. Remove rattles and squeaks 13. Clean for delivery
KNOWLEDGE/THEORY:	1. Knows proper parts needed for replacement 2. Knows how to secure and level vehicle 3. Knows how to disassemble as required a. Electrical components b. Draining and storing of liquids c. Removing of components d. Storing of parts for reuse 4. Knows how to repair components a. Engine components, mounts, water pump, alternator, power steering units, etc. b. Frame c. Front suspension d. Brakes e. Body shell, cowl, doors, etc. 5. Knows how to install sheet metal components a. Radiator supports b. Aligning of components c. Shimming and fitting d. Squaring and leveling e. Torquing and tightening of bolts

6. Knows how to replace parts and check
 - a. Replacing
 - (1) Air conditioner components
 - (2) Grill, headlamps, gravel deflectors, etc.
 - (3) Bumper and align
 - (4) Radiator, hoses, fan, shroud, and coolant
 - (5) Transmission lines
 - (6) Electrical wiring
 - (7) Battery and check electrolyte level
 - b. Checking
 - (1) All lights and replacing bulbs as necessary
 - (2) Engine oil level
 - (3) Coolant level - after thermostat is open
 - (4) Power steering fluid
 - (5) Brake fluid - bleed brakes if necessary
 - (6) Leaks of any kind
7. Knows how to refinish surface
8. Knows how to correct rattles or squeaks and undercoat as necessary
9. Knows how to follow cleanup procedures

VALUE/ATTITUDE
CONCEPTS:

Understands the importance of proper alignment of components for correct fit and for appearance

Understands the importance of carefully checking to assure all components work properly to prevent additional damage and for safe operation of vehicle

TASK AREA:	Frame and Suspension
TASK #43:	Aligns body on frame
COMPETENCY:	Align body on frame so body is level and square with frame
CRITERION:	Can set up automobile so measurements can be made to determine amount body is out of level and alignment with frame Can check to determine any damage of frame, body, or mounting components Can follow correct procedures for replacing or repairing mounting components Can check body alignment to assure that replacement or repair of mounting component brought body into alignment
SKILL/PROCESS:	1. Check frame for alignment and straighten 2. Check alignment of body to frame 3. Align body on frame 4. Check body mounts and replace 5. Check squareness of body with frame 6. Torque mounting bolts 7. Undercoat parts
KNOWLEDGE/THEORY:	1. Knows how to determine if frame is straight to specs 2. Knows how to determine if body is square and level on frame a. Measuring from frame to rocker panels at front and rear of rocker panels b. Measuring height from frame to rocker panels and floor pan c. Checking appropriate locations (1) Front of rocker panels - cowl area at front torque boxes (2) Rear of rocker panels - rear torque box area (3) Rear of vehicle 3. Knows how to align body on frame 4. Knows how to spray undercoating on repaired areas and also on the same areas on the opposite side of the car
VALUE/ATTITUDE CONCEPTS:	Understands the importance of accurate body alignment to prevent damage when in operation and to make vehicle safe for operation

TASK AREA:	Frame, and Suspension
TASK #44:	Checks and repairs frame damage
TASK #45:	Replaces damaged frame components
COMPETENCY:	Check and determine body frame alignment to determine frame damage and straighten frame to bring within manufacturer's specifications
CRITERION:	Can secure and level vehicle on repair equipment Can diagnose frame damage by measuring and gauging according to manufacturer's specifications Can determine repair procedures and replacement of components Can remove damaged components Can remove components that interfere with repair procedure Can straighten damaged frame by using safely and correctly the proper equipment to repair the frame to manufacturer's specifications
SKILL/PROCESS:	1. Identify type of frame 2. Secure vehicle on equipment for diagnosing damage 3. Obtain specifications and charts 4. Locate and identify damaged components 5. Secure replacement components 6. Remove components that interfere with repair work 7. Attach aligning equipment 8. Make pulls to align and straighten frame members 9. Remove damaged components 10. Replace frame components 11. Check alignment of all components 12. Reassemble all components removed 13. Refinish and undercoat 14. Remove from equipment 15. Clean
KNOWLEDGE/THEORY:	1. Knows how to locate and level car on repair equipment a. Safety practices to follow b. Types of equipment used (1) Portable (2) Floor mounted (3) Rack type 2. Knows how to diagnose frame damage a. Use frame diagrams b. Use frame gauges and measuring devices 3. Knows how to prepare car for needed repairs

4. Knows steps to follow in repairing or replacing damaged parts
 - a. Stands
 - (1) Safety
 - (2) Wheel
 - (3) Self aligning
 - (4) Pinch weld clamp tube
 - b. Methods of anchoring
 - c. Use of chains
 - d. Use of clamps and proper hook up methods
 - e. Jacks, tubing and pins
 - f. Proper use of heat
 - g. Proper repair procedures
 - h. Removing parts to be replaced
 - (1) Removing riveted parts
 - (a) Power cutters
 - (b) Cutting torch
 - (c) Power sanders
 - (2) Removing welded members
 - (a) Cutting torch
 - (b) Power saws
 - (c) Power sanders
 - i. Replacing components
 - (1) Checking alignment
 - (a) Measuring
 - (b) Gauging
 - (2) Replacing members
 - (a) Riveting
 - (b) Using hardened bolts
 - (c) Welding
 - (3) Reinforcing methods
 - (4) Rechecking alignment
5. Knows procedures to follow in refinishing and undercoating repaired areas
 - a. Chassis painting
 - b. Weatherproofing procedures for underbody
 - c. Undercoating to prevent rust

VALUE/ATTITUDE
CONCEPTS:

Understands the importance of safety practices and correct procedures in repairing frame damage

Understands the importance of correcting damage to within tolerances specified for vehicle

TASK AREA:	Frame and Suspension
TASK #46:	Aligns rear end suspension parts
COMPETENCY:	Align rear end suspension components to within manufacturer's specifications
CRITERION:	Can obtain specifications for vehicle Can measure and gauge vehicle to determine components out of specification Can replace or repair any damaged component following proper safety practices and correct procedures Can align by adjusting components to within manufacturer's specifications
SKILL/PROCESS:	1. Secure vehicle on equipment 2. Obtain specifications 3. Gauge and measure to determine alignment needs 4. Inspect visually for damaged components 5. Replace damaged components 6. Align by making adjustments according to specifications 7. Remove from equipment 8. Road test
KNOWLEDGE/THEORY:	1. Knows how to identify type of suspension 2. Knows how to secure vehicle on alignment equipment 3. Knows how to obtain and use service information 4. Knows how to use gauging equipment and measuring devices 5. Knows how to conduct inspection and diagnose suspension problems 6. Knows how to obtain tools and materials needed for correction 7. Knows how to replace worn or damaged components as required 8. Knows how to make adjustments to return alignment to specifications 9. Knows how to conduct road test to check for proper operation
VALUE/ATTITUDE CONCEPTS:	Understands the importance of aligning vehicle to correct specifications

TASK AREA:	Frame and Suspension
TASK #47:	Aligns front end suspension parts
COMPETENCY:	Align front end suspension components using appropriate gauges and equipment to bring within manufacturer's specifications
CRITERION:	Can obtain specifications for vehicle Can measure and gauge vehicle to determine components out of specification Can replace or repair any damaged component following proper safety practices and correct procedures Can align by adjusting components to within manufacturer's specifications
SKILL/PROCESS:	1. Secure vehicle on alignment equipment 2. Identify type of suspension 3. Obtain specifications 4. Repack and adjust wheel bearings 5. Check and adjust tire pressure 6. Make pre-alignment checks 7. Replace damaged or worn parts 8. Check and adjust all alignment measurements 9. Balance wheels 10. Road test vehicle
KNOWLEDGE/THEORY:	1. Knows how to secure vehicle on alignment equipment 2. Knows how to identify types and components of suspension systems a. Types of suspension systems (1) Independent coil (front and rear) (2) Torsion bar (3) Lateral torsion bar (front) (4) McPherson strut (front and rear) (5) Twin I-beam (6) Leaf spring b. Shock absorbers, types and application standard, gas-filled, air-lift c. Types of steering systems (1) King pin (2) Ball joint d. Manual steering gears and linkage arrangements e. Power steering: integral and linkage assist f. Front end geometry and steering angles: caster, camber, steering axis inclination, toe-in, toe-out on turns g. Alignment and adjustment methods: slotted hole, shim pack, eccentric cams, strut rod adjustment, toe-in adjustments and steering wheel center 3. Knows how to repack and adjust front wheel bearing

4. Knows how to identify tire types and construction and materials of each
 - a. Bias ply
 - b. Belted bias ply
 - c. Radial
 - d. Rayon
 - e. Nylon
 - f. Steel
 - g. Fiberglass
 - h. Size markings and load ratings
5. Knows how to make pre-alignment inspection
 - a. Shock absorbers
 - b. Tire sizes and pressures
 - c. Tire wear patterns
 - d. Wheel bearing adjustment
 - e. Wheel run-out
 - f. Steering linkage condition
 - g. Ball joint condition
 - h. Steering gear play
 - i. Suspension height
6. Knows how to follow correct alignment procedures
 - a. Check track and steering wheel centering
 - b. Install camber-caster measuring instrument according to manufacturer's instructions
 - c. Measure existing angles
 - d. Adjust to factory specifications
 - e. Adjust toe-in and center steering wheel
 - f. Road test car before returning to customer
7. Knows how to balance wheels
 - a. Types of balance
 - (1) Static balance
 - (2) Dynamic balance
 - b. Types of equipment
 - (1) Bubble balancer
 - (2) Spin balancer (on car)
 - (3) Spin balancer (off car)
 - c. How to apply weights with each type of balancer
 - d. How to use torque wrench and proper tightening procedure when mounting wheels on car

VALUE/ATTITUDE
CONCEPTS:

Understands the importance of aligning vehicle to correct specifications

TASK AREA:	Frame and Suspension
TASK #48:	Locates and identifies suspension damage
COMPETENCY:	Locate and identify suspension component damages and make decision on best method of reconditioning to return vehicle to manufacturer's specifications
CRITERION:	Can visually check full suspension and identify any damage components Can secure manufacturer's specifications for the vehicle suspension system and measure and gauge system to determine if within allowable tolerances Can determine from visual checks and from measuring and gauging components to be replaced, repaired, or adjusted to return to manufacturer's specifications
SKILL/PROCESS:	1. Secure vehicle on alignment equipment 2. Obtain specifications 3. Visually inspect to identify damaged components 4. Check with gauges and by measuring all alignment specifications 5. List all damage and prepare work order
KNOWLEDGE/THEORY:	1. Knows how to use alignment equipment 2. Knows how to use charts and manuals to look up alignment specifications 3. Knows how to locate damage 4. Knows how to identify steering gear damage - Check (1) Tire pressure and tire size (2) Suspension and curb height (3) Tracking (4) Wheel bearing adjustment (5) Run-out (6) All measurements from suspension to frame as given in frame charts (7) Alignment angles (a) Caster (b) Camber (c) Steering axis inclination (d) Center steering (e) Toe-in (f) Toe-out on turns (8) Bent or damaged components by visual inspection, measuring, gauging, and comparison (a) Wheels (b) Spindles and knuckles (c) Backing plates (d) Rotors and drums (e) Ball joints (f) Control arms (g) Steering arms (h) Linkage

- (i) Springs
- (j) Shocks
- (k) Struts and sway bars
- (l) Mounting areas
- (9) Excessive free play
- (10) Tight spots and binding
- (11) Leaks
- (12) Damaged coupling joints
- 5. Knows how to identify steering column damage
Check steering column for:
 - (1) Collapsed
 - (a) Loose
 - (b) Improper gap under steering wheel
 - (c) Sheared break-a-way brackets
 - (2) Neutral and back-up lamp switch and ignition switch
 - (3) Proper operation on tilt and telescope
 - (4) Bent shaft-binding or wobble
 - (5) Bent steering wheel
- 6. Knows how to repair and replace components as necessary
- 7. Knows how to make necessary adjustments to bring alignment to specifications
 - (a) Methods of adjusting
 - (b) Special tools needed

VALUE/ATTITUDE
CONCEPTS:

Understands importance of visual identification of damage

Understands importance of using appropriate specifications and accurate measuring and gauging to identify damage

TASK AREA:	Frame and Suspension
TASK #49:	Locates and identifies frame damage
COMPETENCY:	Check body frame alignment to determine frame damage, straightening and/or replacement of frame components, repair procedures and cost estimate
CRITERION:	Can secure and level vehicle on repair equipment Can secure frame specification and interpret to check all measurements and components Can diagnose frame damage by measuring and gauging according to manufacturer's specifications Can determine repair procedures and replacement of components Can prepare an accurate listing of parts to be replaced Can prepare an accurate estimate of damage and cost of repair Can remove components that interfere with locating and checking for damage
SKILL/PROCESS:	1. Identify type of frame 2. Secure vehicle on equipment for diagnosing damage 3. Obtain specifications and charts 4. Locate and identify damaged components by visual method 5. Remove components that interfere with estimating damage 6. Gauge and measure according to specifications 7. Prepare list of parts and cost 8. Prepare labor cost
KNOWLEDGE/THEORY:	1. Knows how to identify types of frames a. Year, model, and make of car b. Ladder c. "X" frame d. Perimeter - torque box e. Ladder or perimeter with "X" - member f. Fully unitized body and frame g. Unitized with bolt on sheet metal front end parts h. Unitized with stub frame i. Unitized with K - member j. Platform type 2. Knows how to level car 3. Knows how to use frame diagrams 4. Knows how to look for buckles, cracked welds, flaking paint or undercoating, etc. 5. Knows how to use tram gauge and tape

6. Knows how to use gauges
 - a. Center line gauges
 - b. Datum gauges
 - c. Tracking gauges
 - d. Diamond detector
7. Knows how to locate and identify the damage
 - a. Sidesway
 - b. Sag
 - c. Mash
 - d. Diamond
 - e. Twist
 - f. Crossmember damage
 - (1) Sag
 - (a) Specifications in frame manual
 - (b) Compare with undamaged car
 - (c) Causes excessive negative camber
 - (2) Rolled or twisted
 - (a) Measure by specifications
 - (b) Affects caster
 - (3) Damaged mounting areas
Caster struts, control arm, shafts,
etc.
8. Knows proper methods of estimating repair costs
 - a. Estimated time
 - b. Number of hook ups

VALUE/ATTITUDE
CONCEPTS:

Understands importance of visual identification of damage

Understands importance of using appropriate specifications and accurate measuring and gauging to identify damage

TASK AREA:	Cooling System
TASK #50:	Repairs or replaces and tests cooling system components
COMPETENCY:	Inspect cooling system to determine repair work necessary, make decision on repair and materials needed, and repair system to operate within manufacturer's specifications without leaks
CRITERION:	Can pressure test cooling system to locate leaks Can select correct replacement components Can install replacement components and/or make minor adjustment to seal system from leakage Can refill system and check coolant for proper specific gravity level
SKILL/PROCESS:	1. Visually inspect for leaks and damages 2. Pressure test system 3. Check for maintenance of pressure 4. Repair and/or replace components 5. Refill with coolant and check specific gravity level 6. Pressure test radiator cap 7. Warm-up engine and check coolant level and flow
KNOWLEDGE/THEORY:	1. Knows how to inspect and pressure test cooling system for leaks 2. Knows repairs which can be made by the body shop 3. Knows how to diagnose water pump problems and replace as needed 4. Knows how to select and replace cooling system and heater components 5. Knows how to refill with coolant, warm-up engine, recheck coolants level and test specific gravity
VALUE/ATTITUDE CONCEPTS:	Understands the importance of properly operating cooling systems Understands the importance of the vehicle being "road ready" when delivered to the customer

TASK AREA: Metalworking

TASK #51: Replaces radiators and radiator supports

Listed with Task #42

TASK AREA:	Cooling System
TASK #52:	Replaces air conditioning components
TASK #53:	Recharges air conditioning system with freon
COMPETENCY:	Replace damaged air conditioning components with correct replacement parts, securing properly and torquing fastenings to assure system does not leak Evacuate and recharge system with freon using gauges to check pressures and assure filling with appropriate amount of refrigerant
CRITERION:	Can inspect for damage and test for leaks Can select replacement part and replace following manufacturer's specifications Can evacuate and recharge system following safe practices
SKILL/PROCESS:	1. Visually inspect for damage 2. Obtain required tools, equipment and materials 3. Hook up gauge set 4. Check pressure and diagnose problem 5. Discharge system 6. Replace parts as needed 7. Check oil level 8. Replace oil 9. Close system 10. Evacuate system and check for maintenance of vacuum 10A. If vacuum cannot be maintained, check system for leaks by recharging 10B. Repair leaks 10C. Evacuate system 11. Charge system according to specifications 12. Run system to check for proper operation
KNOWLEDGE/THEORY:	1. Knows proper safety procedures 2. Knows function of the components of the system a. Compressor, clutch, and pulleys b. Condenser c. Receiver-drier d. Filter e. Expansion valve f. Refrigerants g. Refrigerant oil 3. Knows how to inspect and test unit 4. Knows how to replace damaged parts and check oil 5. Knows how to evacuate and leak test system 6. Knows how to properly recharge system with refrigerant
VALUE/ATTITUDE CONCEPTS:	Understands the importance of following correct procedures and safety practices

TASK AREA:	Cooling System
TASK #54:	Repairs and replaces transmission cooling lines
COMPETENCY:	Inspect for damage and repair or replace transmission cooling lines with correct replacement parts making sure there are no oil leaks
CRITERION:	Can visually check to identify leaks and/or damaged lines Can repair or replace damaged lines to assure proper flow of fluids and no leakage Can refill transmission with correct fluid to proper level
SKILL/PROCESS:	1. Inspect transmission lines for leaks and damages 2. Remove damaged lines 3. Replace or repair lines as needed 4. Check and refill transmission fluid 5. Run vehicle and check for leaks 6. Check radiator coolant for oil in coolant 7. Check transmission fluid for water 8. Test drive for proper operation 9. Recheck for fluid level and leaks
KNOWLEDGE/THEORY:	1. Knows how to inspect transmission lines and cooling coils for leaks and damage 2. Knows how to remove and replace or repair lines as needed 3. Knows how to fill transmission to the proper level with the proper oil 4. Knows how to road test for proper operation and recheck fluid level and check for leaks
VALUE/ATTITUDE CONCEPTS:	Understands the importance of customer relations by assuring that vehicle is "road ready"

TASK AREA:	Glass and Trim
TASK #55:	Removes and replaces inside soft trim
COMPETENCY:	Remove inside soft trim and replace if damaged with appropriate trim to restore to original style and condition
CRITERION:	Can remove trim hardware without damage to components Can remove soft trim without damaging and store if to be reused so trim will not get soiled or damaged Can select replacement trim for damaged or soiled parts to be replaced Can replace trim using proper procedures and securing methods to return vehicle to satisfactory condition Can clean soiled trim using correct cleaners to return to satisfactory condition
SKILL/PROCESS:	1. Visually inspect for damage 2. Locate car model number and trim code 3. Order parts 4. Protect interior trim not to be replaced 5. Remove components for access to trim 6. Install new trim 7. Install all components 8. Clean interior
KNOWLEDGE/THEORY:	1. Knows how to select proper tools 2. Knows how to remove and replace hardware and components 3. Knows steps to take in protecting trim 4. Knows how and sequence to remove and replace trim 5. Knows how to attach soft trim for proper fit 6. Knows types of cleaners to use in cleaning
VALUE/ATTITUDE CONCEPTS:	Understands and appreciates the importance of maintaining cleanliness and not damaging components Understands the importance of returning vehicle to condition satisfactory to customer

TASK AREA:	Estimating
TASK #56:	Estimates collision repair costs
COMPETENCY:	Estimate collision repair costs using estimator's "crash guides" to determine accurately the parts required, cost of the parts, time and labor estimates, and the overall cost of the repairs
CRITERION:	Can establish a sequence for systematically preparing estimates Can select proper manuals and "crash guides" to be used in preparing the estimates Can obtain proper forms and aids to estimating Can accurately determine all damaged components to determine components to be replaced and to be repaired Can use "crash guides" to determine part numbers, price of parts, time of labor for replacing parts Can estimate time for labor to straighten, align and repair components Can estimate time for refinishing Can estimate amount of materials for refinishing Can compute cost of parts according to "crash guides" Can determine labor cost according to estimated time for labor and hourly rate and flat rates Can compute cost for refinishing Can compute taxes and miscellaneous costs Can determine total estimated cost
SKILL/PROCESS:	1. Position vehicle for access to all components 2. Acquire estimating aids and materials 3. List all information and identification data 4. Itemize all damage and costs on forms a. List all components and replacement parts, part numbers, and costs b. List labor time and costs c. List all materials and costs d. List all sublet items and costs e. Figure sales tax 5. Compute and total estimate
KNOWLEDGE/THEORY:	1. Knows how to obtain and use guides and manuals to obtain required information 2. Knows how to obtain and record all identification information needed about the owner and the vehicle

- a. Name, address, and phone number of customer
- b. Date
- c. Vehicle identification
 - (1) Vehicle - manufacturer
 - (2) Year
 - (3) VIN - Vehicle identification number
 - (4) Date of production
 - (5) Body style number
 - (6) Color code
 - (7) Interior trim number
 - (8) Mileage
 - (9) License number

**VALUE/ATTITUDE
CONCEPTS:**

Understands the importance of accuracy in preparing estimates of cost and material list

Appreciates the importance of accuracy to assure a reasonable profit

Understands the importance of accuracy in estimate to assure proper parts are ordered and available when work begins so job can be completed on schedule

TASK AREA:	Metalworking
TASK #57:	Replaces quarter panel
COMPETENCY:	Remove and replace quarter panel and component parts so panel will align with component panels, glass, moldings and bumpers without wind noise, water, or dust leaks with proper spacing around quarter panel
CRITERION:	Can remove components that will interfere with removal and replacement of quarter panel Can select and set up pulling equipment to align and rough out adjoining panels Can determine points of cutting and cut out damaged quarter panel and remove Can clean and prepare adjoining panels to be fitted to replacement panel Can fit replacement panel to adjoining panels for correct alignment and so joints can be welded Can weld panel using proper processes so weld joints are structurally sound and can be finished to satisfactory appearance Can properly finish and seal joints to acceptable appearance
SKILL/PROCESS:	1. Secure vehicle on stands 2. Obtain repair parts 3. Remove components as necessary 4. Rough out to obtain alignment to adjoining panels 5. Remove damaged panel 6. Clean and prepare joints for replacement panel 7. Secure, fit and align replacement panel in position 8. Weld panel in place and check alignment 9. Clean welds 10. Fill joints to proper contour 11. Finish joints 12. Apply primer-surfacer as needed 13. Seal welded joints to weatherproof 14. Drill for ornamentation 15. Trim edges of panel with correct color paint 16. Replace all components 17. Leak test 18. Refinish as required 19. Replace nameplates and emblems 20. Clean up for delivery

KNOWLEDGE/THEORY:

1. Knows how to secure vehicle in proper location for repairs
2. Knows how to obtain proper parts, materials, and tools
3. Knows how to remove trim, glass, and components as necessary
4. Knows how to use pulling and jacking equipment as needed to rough out to obtain alignment to adjoining panels
5. Knows how to remove old panel and clean up weld area
6. Knows how to prepare joints for welding and fit panel in place in proper alignment
7. Knows proper welding procedures to secure panel to vehicle
8. Knows how to clean, fill, and finish joints to proper contour
9. Knows how to apply primer-surfacer
10. Knows how to weatherproof welded joints and protect panels from rust
11. Knows correct procedures to reinstall trim, glass, ornamentation, and other components
12. Knows how to conduct leak tests to insure vehicle is leak free
13. Knows proper procedures to refinish damaged part as needed
14. Knows how to clean and prepare car for delivery

VALUE/ATTITUDE
CONCEPTS:

Understands the importance of structural soundness and vehicle appearance to assure customer satisfaction

TASK AREA:	Glass and Trim
TASK #58:	Repairs vinyl components
COMPETENCY:	Repair vinyl covers using correct materials and procedures to assure color match, grain match, a strong bond, and weatherproof seal for the top
CRITERION:	Can clean and prepare area to be repaired with correct cleaners Can remove damaged area and prepare surface with correct chemical agents for tapering edges Can select grain match materials and cut to appropriate size Can fill patch area with vinyl filling compound, and grain damaged fill area Can heat cure patch area to correct appearance Can color match with vinyl top dye and vinyl weatherproofing seal
SKILL/PROCESS:	1. Select repair materials and tools 2. Clean and prepare damaged area 3. Prepare vinyl materials 4. Apply vinyl material 5. Prepare graining material 6. Apply graining material to grain 7. Cure 8. Apply vinyl finish 9. Clean equipment
KNOWLEDGE/THEORY:	1. Knows how to analyze damage to determine if repairable or replacement is required 2. Knows how to use tools 3. Knows cleaning methods and techniques 4. Knows how to prepare for fillers 5. Knows how to mix and apply fillers and apply correct pattern 6. Knows how to use release agent 7. Knows how to heat with heat gun to cure 8. Knows how to select proper color and spot blend 9. Knows how to clean and refinish top 10. Knows how to clean and store equipment
VALUE/ATTITUDE CONCEPTS:	Understands the importance of vehicle appearance to customer

TASK AREA:	Glass and Trim
TASK #59:	Installs decals
COMPETENCY:	Removes and replaces decals without damage to surface from which removed and replace decals in correct position and seal without air bubbles or wrinkles
CRITERION:	Can remove decals using correct process for the type of decal material being removed Can clean decal area using correct chemical cleaner for surface to be cleaned Can determine if refinish is necessary and refinish Can cut and fit replacement decal to proper fit Can use correct process to install decal so decal is aligned and bonded without wrinkles or air bubbles underneath
SKILL/PROCESS:	1. Obtain proper transfer 2. Remove moldings as required 3. Remove old transfer 4. Clean adhesive from panel 5. Repair panel as needed 6. Refinish panel to proper color 7. Fit decal and trim as necessary 8. Prepare wetting solution 9. Apply wetting solution to panel 10. Soak decal in warm water 11. Remove backing from decal and apply to panel 12. Remove air bubbles 13. Heat and mold around curves and contours 14. Trim to exact fit 15. Mold around edges of panels 16. Replace moldings 17. Clean
KNOWLEDGE/THEORY:	1. Knows how to identify the make, year, and model of the vehicle 2. Knows how to gain entrance to bolt and nuts using proper tools 3. Knows how to remove old decal and clean surface 4. Knows how to refinish surface to correct color before applying decal 5. Knows how to use correct measuring in fitting decals 6. Knows solutions to use in applying decal to surface and placement of design on the panel 7. Knows methods of removing air bubbles
VALUE/ATTITUDE CONCEPTS:	Understands and accepts customer's personal preference and strives to complete work to customer satisfaction

TASK AREA:	Electrical
TASK #60:	Aims headlamp
COMPETENCY:	Use proper tools and equipment to aim headlamp to correct specifications
CRITERION:	Can clean and prepare headlamp for aiming Can install headlamp Can aim headlamp by adjusting screws to bring lamp aim to proper specifications
SKILL/PROCESS:	1. Secure headlamp aiming equipment 2. Locate car on level surface 3. Clean headlamp and check for proper operation 4. Check tire pressure 5. Remove moldings for access to adjusting screws if necessary 6. Calibrate headlamp aimer 7. Position headlamp aimer on lamp and secure 8. Check specification and compare with readings on aimer 9. Adjust to bring within specifications 10. Remove headlamp aimer 11. Replace moldings 12. Clean
KNOWLEDGE/THEORY:	1. Knows how to locate car on level surface, adjust tire pressure, and check curb height 2. Knows how to calibrate and install equipment 3. Knows how to remove headlamp doors if necessary 4. Knows how to use equipment and make proper adjustments to return lamps to specifications 5. Knows how to adjust concealed lamps to proper alignment in closed position 6. Knows how to remove and store equipment 7. Knows how to replace components removed for headlamp aiming 8. Knows how to clean lamps and related components
VALUE/ATTITUDE CONCEPTS:	Understands the importance of headlamp aim for safety of automobile operation

TASK AREA:	Painting
TASK #61:	Cleans and maintains spray equipment
COMPETENCY:	Clean and maintain spray equipment so all components are in proper operating order
CRITERION:	Can disassemble spray gun and clean with correct cleaning agent Can reassemble spray gun and adjust for proper spray pattern Can safely disassemble and clean transformers, traps, and filters and properly reassemble to assure no leakage of air Can drain air compressor tank of all water Can clean air compressor cooling fins and filters using proper procedures Can lubricate and change oil in air compressor with correct lubricants and oil Can clean air cooling fins of all foreign matter
SKILL/PROCESS:	1. Disassemble spray gun 2. Clean fluid parts and passages with proper solvents 3. Reassemble spray gun and lubricate 4. Run solvent through gun 5. Check for flow and spray pattern 6. Turn off power source to compressor 7. Drain compressor tank 8. Clean filters 9. Check oil level and fill to proper level 10. Lubricate fittings 11. Check belts for tension and adjust 12. Clean cooling fins and intake filters 13. Clean spray filters and/or replace 14. Clean or replace paint arrester filters 15. Clean spray booth - sweep and wash 16. Drain all water traps
KNOWLEDGE/THEORY:	1. Knows different components of spray equipment 2. Knows operational procedures of different types of air supply equipment and maintenance of each 3. Knows installation and function of air lines and transformers a. Components of system b. Location of the components in the system c. Routing d. Pipe sizes e. Air hoses, fittings, sizes f. Pressure drop

4. Knows appropriate procedures for maintaining spray equipment
 - a. Types - suction, pressure gun operation
 - b. Disassembly and cleaning
 - c. Reassembly and lubrication
 - d. Spray patterns and techniques
5. Knows cleaning procedures and cleaning agents to use in cleaning equipment

VALUE/ATTITUDE
CONCEPTS:

Understands the importance of clean and well maintained equipment for most efficient work

TASK AREA:	Metalworking
TASK #62:	Installs partial panels using steel, fiberglass, or other materials
TASK #65:	Repairs rusted areas
TASK #67:	Repairs and installs rocker panels
COMPETENCY:	Install partial panel using steel and forming to original body contours by welding to restore to correct structural strength with panel aligned in proper relationship to other panels
CRITERION:	Can determine extent of damage and remove panel using proper safety practices and correct procedures for removal Can cut and fit replacement panel so panel can be welded in place Can grind weld and prepare body filler Can apply filler as needed and prepare surface for finish Can weatherproof underside of panel
SKILL/PROCESS:	1. Select tools 2. Clean area 3. Remove damaged area 4. Crimp and align edges 5. Lay out partial panel to correct size 6. Clamp or secure in place 7. Weld panel 8. Grind weld joints and clean 9. Fill partial panel to contour 10. File and finish to original contour 11. Undercoat back part of panel if necessary 12. Finish panel to matching color 13. Clean
KNOWLEDGE/THEORY:	1. Knows how to secure vehicle in proper location for repairs 2. Knows how to obtain proper parts, materials, and tools 3. Knows how to remove trim, glass, and components as necessary 4. Knows methods of removing partial panel 5. Knows how to prepare replacement panel and crimp to fit panel in place a. Cutting panel b. Aligning 6. Knows how to clamp panel in place and secure for welding a. Clamping b. Riveting c. Welding

7. Knows proper welding procedures to secure panel to vehicle
8. Knows how to clean, fill, and finish joints to proper contour
9. Knows how to apply primer-surfacer
10. Knows how to weatherproof welded joints and protect panels from rust
11. Knows correct procedures to reinstall trim, glass, ornamentation, and other components
12. Knows how to conduct leak tests to insure vehicle is leak free
13. Knows proper procedures to refinish damaged part as needed
14. Knows how to clean and prepare car for delivery

VALUE/ATTITUDE
CONCEPTS:

Understands the importance of procedures, cleanliness, and safety in installing partial panels

TASK AREA:

Metalworking

TASK #63:

Utilize lifting equipment

Listed with Task #40

TASK AREA:	Glass and Trim
TASK #64:	Removes and replaces exterior moldings and ornamentation
COMPETENCY:	Remove and replace exterior moldings and ornamentation using proper types of retainers, adhesives and tools assuring alignment with adjoining moldings without damage to paint or other panels and molding
CRITERION:	Can remove moldings using proper techniques without damaging moldings or surfaces Can remove ornamentations using proper procedures without damage to ornaments or surfaces Can lay out and fit moldings and ornamentation in proper alignment using correct fastening methods without damage to surface
SKILL/PROCESS:	1. Select proper tools and service information 2. Remove component parts that interfere with removal of molding 3. Remove molding and ornamentations 4. Repair panel and/or finish 5. Fit molding and align 6. Drill holes and/or prepare for fastening 7. Fasten molding 8. Clean surface
KNOWLEDGE/THEORY:	1. Knows procedures to follow in removing moldings and ornamentations a. Care and protection of trim and adjacent areas b. Tools and their use c. Types of clips d. Use of heat gun on glued moldings 2. Knows steps to follow in installing moldings and ornamentations a. Moldings with mechanical retainers (1) Locating and aligning (2) Preparing holes for fasteners (3) Finishing (4) Installing and aligning b. Moldings secured with adhesives (1) Types of adhesives (2) Methods of using adhesives (3) Methods of aligning (4) Methods of securing while adhesive cures (5) Methods of curing adhesive
VALUE/ATTITUDE CONCEPTS:	Understands the importance of preventing damage to surrounding surfaces

TASK AREA: Metalworking
TASK #65: Repairs rusted areas

Listed with Tasks #62 & #67

TASK AREA:	Metalworking
TASK #66:	Installs outer door panels
COMPETENCY:	Remove door outer panels, disassemble door components parts and replace with outer panel so edges are smooth and component panels fit in opening and door operates properly
CRITERION:	Can prepare door for removal of panel by removing moldings and removing door from body shell Can remove damaged panel using correct practices Can make repairs to inner door panels and reinforcing beams Can crimp replacement panel in place and weld to secure Can clean, prime, and weatherproof panel Can install and align door to operate properly
SKILL/PROCESS:	1. Secure replacement panel and parts 2. Remove moldings, trim, and glass 3. Remove door from body 4. Clean door 5. Remove hardware and mechanisms that interfere with work 6. Grind edges of panel to cut to remove 7. Repair inner reinforcing beams and inner panels 8. Repair channels and window mechanisms 9. Fit replacement panel and clamp in place 10. Crimp edges of panel in place 11. Weld panel to secure 12. Clean panel 13. Drill holes for ornamentation 14. Spray with primer-surfacer material 15. Weather and sound proof panel 16. Refinish door edges 17. Install, align, and adjust door to fit and operate properly 18. Replace door glass and adjust 19. Check all electrical components 20. Replace interior trim and hardware 21. Check for noises 22. Paint exterior to color match 23. Replace moldings 24. Clean
KNOWLEDGE/THEORY:	1. Knows how to order replacement parts 2. Knows use of proper tools to remove the door, how to disconnect electrical components and support the door assembly safely 3. Knows how to protect soft trim and glass 4. Knows use of grinders, air chisel and spot weld drills to remove outer panel

5. Knows how to use body tools to straighten metal
6. Knows how to remove rust and paint and smooth spot weld safely
7. Knows how to align outer and inner panels and the use of clamping tools
8. Knows the use of body tools to crimp edges
9. Knows how to use welding equipment
10. Knows how to perform minor sheet metal repairs
11. Knows how to sand and apply primer-surfacer and seal
12. Knows how to refinish to proper color
13. Knows how to install and align door
14. Knows how to clean equipment and store safely

VALUE/ATTITUDE
CONCEPTS:

Understands the importance of eliminating damage and following proper installation procedures

TASK AREA:

Metalworking

TASK #67:

Repairs and installs rocker panels

Listed with Tasks #62 & #65

TASK AREA:	Painting
TASK #68:	Mask before painting
COMPETENCY:	Apply proper masking material to protect hardware, trim, glass, and adjoining panels from grinding, sanding, or painting to assure protection of surfaces not to be painted and that painted surfaces are exposed for painting
CRITERION:	Can clean surfaces to be masked with proper cleaning agents Can apply masking tape and paper so masking protects surfaces not to be painted but does not overlap surfaces to be painted
SKILL/PROCESS:	1. Wash car completely 2. Dry completely 3. Remove ornaments 4. Remove mirrors and antennas 5. Clean with wax and grease remover 6. Tape weatherstripping 7. Mask wheels with covers 8. Tape moldings 9. Tape glass and cover windows 10. Mask all surfaces not to be painted 11. Check all masking to insure tape is secure
KNOWLEDGE/THEORY:	1. Knows how to clean vehicle for masking a. Washing b. Drying c. Cleaning with solvents d. Preparing weatherstrips for masking 2. Knows materials and how to use for masking a. Masking tapes and use b. Masking papers 3. Knows surfaces to mask and how to mask each a. Exterior trim b. Glass c. Weatherstrip d. Surfaces not to be painted 4. Knows methods of applying masking a. Proper tape sizes for application b. Items not to be masked c. Fitting and cutting paper
VALUE/ATTITUDE CONCEPTS:	Understands the importance of careful and accurate masking to prevent overspray and to assure full coverage of parts to be painted

TASK AREA:	Estimating
TASK #71:	Writes repair orders and prepares statement of cost
COMPETENCY:	Write a repair order describing vehicle, owner, work to be performed, and date of delivery and prepare an accurate statement of cost
CRITERION:	Can obtain and fill in proper information pertaining to vehicle identification and vehicle owner/or person authorizing work Can describe accurately the repairs to be performed Can prepare statement of cost by accurately listing parts, labor, miscellaneous charges, and taxes to repair order
SKILL/PROCESS:	1. Record owner information 2. List all available identification data 3. Record delivery time and location of delivery 4. List repairs to be performed 5. List damage not to be repaired 6. Get authorization signature of person authorizing work 7. List parts and prices 8. Record all changes 9. Total all costs 10. Record repairs not performed 11. Route copies to proper departments
KNOWLEDGE/THEORY:	1. Knows how to obtain and record information about: a. Name, address, phone number of customer b. Date c. Signature of person authorizing repairs d. Vehicle identification (1) Make - manufacturer (2) Year (3) VIN (Vehicle identification number) (4) Date of production (5) Body style number (6) Color code (7) Interior trim number (8) Mileage (9) License number e. Promised completion time f. Delivery time if required g. Directions to location of delivery 2. Knows how to write instructions for repairs to be done 3. Knows how to use flat rate manuals and service information to figure labor charges 4. Knows how to figure costs of parts, materials, labor, sublet items, and taxes to compute total bill

5. Knows to route copies of completed repair order to proper departments
 - a. Service department files
 - b. Cashier (customer copy)
 - c. Bookkeeping

**VALUE/ATTITUDE
CONCEPTS:**

Understands the importance of accurate and clearly written repair orders to assure proper work is accomplished according to customer requirements

TASK AREA: Servicing

TASK #75: Cleans up and prepares a car for delivery

COMPETENCY: Clean car inside and outside by washing, vacuuming, and other appropriate means to remove all dust and residues

CRITERION: Can vacuum inside of vehicle to remove all dust, dirt, and residues
Can clean inside of vehicle using proper cleaning agents to remove soil and stains without discoloration or damage to upholstery and trim
Can clean exterior of car by washing with water and detergents to remove soil and residues

SKILL/PROCESS:

1. Vacuum interior and trunk
2. Clean upholstery
3. Clean under hood to remove residue
4. Wash exterior
5. Clean chrome
6. Clean tires
7. Clean glass
8. Replace all personal items

KNOWLEDGE/THEORY:

1. Knows how to clean mats and luggage compartment by vacuuming
2. Knows how to determine procedures and materials for cleaning interior trim
3. Knows how to wash exterior of vehicle without damaging paint, trim, or glass
4. Knows how to clean exterior trim, glass, and tires
5. Knows to replace all of owners' possessions in proper location

VALUE/ATTITUDE CONCEPTS: Understands the importance of vehicle appearance for customer satisfaction

TASK AREA:	Servicing
TASK #75A:	Road tests and checks car for delivery
COMPETENCY:	Prepare car for delivery by checking cleanliness, functioning of components, and road testing to determine there are no squeaks, rattles, wind noises, or mechanical problems
CRITERION:	Can check vehicle to assure vehicle is cleaned to customer satisfaction Can check vehicle to assure that finishes match and meet customer's satisfaction Can road test vehicle to assure that all components function properly Can road test vehicle to determine wind noise, squeaks, and rattles and identify corrective action
SKILL/PROCESS:	1. Check tires and pressure 2. Check all items for proper functioning; lights, accessories, etc. 3. Road test for proper functioning of all components 4. Road test for noises 5. Check cleanliness
KNOWLEDGE/THEORY:	1. Knows how to visually check car for cleanliness and prepare alignment and operation of body components 2. Knows how to check lights and accessories for proper operation 3. Knows how to check tires for proper inflation 4. Knows how to inspect paint finish for proper color match, texture, and gloss 5. Knows how to conduct road test to assure that all components function properly with no objectionable squeaks, rattles, and wind noise 6. Knows how to check that all components and owners' possessions are in proper location
VALUE/ATTITUDE CONCEPTS:	Understands the importance of road test to check for safety and vehicle performance

TASK AREA:	Frame and Suspension
TASK #76:	Diagnoses and replaces steering column and steering components
COMPETENCY:	Diagnose repair needs for steering column and steering components and make repairs to return steering assembly to proper operating condition and manufacturer's specifications
CRITERION:	Can determine damage to steering column and components by visual checks, comparative measurements, and by operation of the steering wheel Can select correct replacement parts, remove damaged parts, and replace new components following manufacturer's procedures and specifications
SKILL/PROCESS:	1. Obtain service information 2. Inspect steering wheel and column for damage 3. Remove components to gain access to column 4. Remove assembly 5. Disassemble 6. Replace and adjust damaged parts 7. Reinstall and torque assembly 8. Replace and adjust all components 9. Check for proper operation of all components 10. Check alignment of steering wheel
KNOWLEDGE/THEORY:	1. Knows how to obtain service information, tools, and repair parts required 2. Knows how to check steering columns for proper operation and for collision damage 3. Knows how to check tilt and telescoping columns for proper operation 4. Knows how to remove and replace assembly without damaging 5. Knows how to check, repair, replace, and adjust shift linkage, column locks and all electrical components 6. Knows how to replace damaged impact absorbing components according to specifications 7. Knows how to reassemble and install complete unit properly and check for proper operation of all components 8. Knows how to road test for proper operation
VALUE/ATTITUDE CONCEPTS:	Understands safety factors and hidden damage and the importance of careful and accurate diagnosis and repair

TASK AREA:	Electrical
TASK #77:	Checks and repairs electrical circuits
TASK #81:	Services battery safely
COMPETENCY:	Check and repair electrical systems and make minor repairs to return system to its normal operating condition
CRITERION:	Can visually identify damaged, inoperative, or broken electrical components Can check circuits using test instruments and following wiring diagrams to determine malfunction Can replace components with correct replacement Can repair wiring circuits using correct materials and procedures Can replace or service battery with correct replacement battery following safe practices
SKILL/PROCESS:	1. Check battery for full charge 2. Check battery terminals and cables for good connections 3. Check interior and exterior lights for operation 4. Replace bulbs as needed 5. Check gauges and accessories 6. Replace fuses as needed 7. Visually check wires for any damage 8. Check for good ground connection 9. Check wiring for open circuit with ohmmeter 10. Check circuit with voltmeter for voltage 11. Trace open using test light and jumper wires 12. Check battery drain with amperage meter 13. Repair as needed
KNOWLEDGE/THEORY:	1. Knows how to use hydrometer and battery tester and how to check connections and clean terminals and check polarity safely 2. Knows how to hook up and set charger for proper operation safely 3. Knows whether a circuit is operating properly 4. Knows how to read wiring diagrams - volts, amps, ohms 5. Knows how to replace fuses and lamp bulbs safely 6. Knows how to use test light, voltmeter, ohmmeter, and ammeter safely 7. Knows how to use hand tools to replace units 8. Knows whether systems are working properly or not
VALUE/ATTITUDE CONCEPTS:	Understands the importance of accurately diagnosing and repairing electrical components damage to prevent further damage and provide for safe vehicle operation

TASK AREA:	Glass and Trim
TASK #78:	Repairs and replaces seat tracks and frames
COMPETENCY:	Repair and replace seat track and frame so seats function properly and can be positioned to suit owner's needs
CRITERION:	Can remove seat adjusters and restraint systems following correct procedures Can identify damaged component and replace or repair Can remove and replace seat covers and trim without damage to gain access to seat frame Can repair seat frame by shaping and/or welding to return to original form Can install upholstery and trim without damage and soiling Can install seat so seat adjusts properly and locks securely in position
SKILL/PROCESS:	1. Obtain service information 2. Inspect for visual damage 3. Disconnect battery ground on electrical connections 4. Remove seat and adjusters 5. Repair or replace manual adjusters 6. Check electrical seat function 7. Check electrical wiring and fuses 8. Repair electrical components and wiring 9. Replace or repair electrical components 10. Remove seat trim as necessary 11. Replace seat frame or repair 12. Check and repair interlock systems 13. Replace or repair soft trim as needed 14. Reassemble adjusters to seat assembly 15. Adjust power adjusters for proper operation 16. Reinstall assembly 17. Reconnect electrical wiring 18. Connect battery and check for voltage draw 19. Check for proper operation 20. Clean trim and upholstery as needed
KNOWLEDGE/THEORY:	1. Knows how to look up service information 2. Knows how to remove and disassemble seats 3. Knows how to repair or replace mechanical adjusters 4. Knows how to repair or replace power seat 5. Knows how to test and repair or replace electrical components 6. Knows how to remove and repair or replace soft trim 7. Knows how to repair or replace seat frames 8. Knows how to repair or replace and adjust seat

9. Knows how to remove and replace restraint systems and check for proper operation
10. Knows how to clean interior trim

**VALUE/ATTITUDE
CONCEPTS:**

Understands the importance of completing repair work so that seat is adjusted properly and customer satisfied

TASK AREA:	Metalworking
TASK #79:	Removes and replaces fuel tank and checks lines for leaks
COMPETENCY:	Remove and replace fuel tank following safe procedures for handling gasoline and correct procedures for removing and installing to assure tank is secure and does not leak
CRITERION:	Can prepare fuel system for removal of tank by purging tank and system of fuel in a safe manner Can remove fuel tank by following safe practices and correct procedures for removal of lines and supports Can check lines for leaks and repair by replacing damaged part of line and/or tightening connections Can repair tank using proper safety methods and correct practices Can install fuel tank securing properly and connecting with lines and fillers so there are no leaks
SKILL/PROCESS:	1. Place vehicle on safety stands 2. Disconnect battery ground 3. Remove fuel and store properly 4. Inspect and determine safe removal procedures 5. Disconnect electrical wiring, fuel lines, and filler pipes 6. Support tank for removal on proper equipment 7. Remove straps and lower tank 8. Store tank in safety area 9. Check tank for damage 10. Determine if tank can be repaired or if tank needs replacing 11. Repair only - following <u>strict</u> safety practices 12. Check sending unit for proper operation 13. Replace tank in reverse order of removal 14. Reconnect lines and wiring 15. Refill with fuel 16. Check for clearances and leaks 17. Connect battery cable 18. Check operation of fuel gauge
KNOWLEDGE/THEORY:	1. Knows proper safety procedures and precautions for removing, storing, and replacing fuel tanks and contents 2. Knows how to protect fuel lines and vapor systems during repairs 3. Knows how to repair or replace fuel lines 4. Knows how to test and repair or replace electrical wiring, fuel gauges, and sending units 5. Knows how to check for damage to tank and for leaks

6. Knows how to install tank and all related components properly
7. Knows how to replace fuel and check all fuel lines and fittings for leaks

**VALUE/ATTITUDE
CONCEPTS:**

Understands the importance of observing safety precautions in the removal and replacement of gas tanks

TASK AREA:	Frame and Suspension
TASK #80:	Replaces and overhauls bumper assemblies
COMPETENCY:	Replace and repair bumper assemblies by replacing parts with correct parts and installing so bumper is aligned with frame and body with equal overhang, proper clearance, and is level
CRITERION:	Can remove bumper assembly using correct procedures and safety practices Can identify damaged parts and secure correct replacement parts Can reassemble bumper assembly using correct procedures and safety practices Can align bumper assembly so bumper is level, centered, and has proper clearance between body components
SKILL/PROCESS:	1. Secure vehicle on stands 2. Diagnose damage 3. Determine repair procedure 4. Obtain service data 5. Obtain replacement parts 6. Disconnect electrical connections 7. Remove bumper assembly following manufacturer's safety precautions 8. Check for frame damage and repair 9. Disassemble as needed to replace parts 10. Repair parts as needed 11. Reassemble bumper assembly and align component 12. Attach assembly to vehicle and align 13. Reconnect electrical components 14. Check for proper operation of lights 15. Clean
KNOWLEDGE/THEORY:	1. Knows how to select and obtain proper repair parts 2. Knows how to disconnect electrical components 3. Knows how to remove assembly from vehicle safely 4. Knows how to disassemble for repair and replacement of parts 5. Knows how to straighten and repair attaching components and attaching areas 6. Knows how to inspect and check energy absorbers 7. Knows how to assemble and align all components 8. Knows procedure for attaching assembly to vehicle and how to adjust to proper alignment 9. Knows how to connect, test, and repair electrical components as required
VALUE/ATTITUDE CONCEPTS:	Understands the importance of following safety practices in removing component parts of the bumper assembly

Understands the importance of a proper functioning
bumper for safety and prevention of further damage

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TASK AREA:	Servicing
TASK #82:	Locates and eliminates leaks and noises
COMPETENCY:	Locate and eliminate water, dust, and air leaks and wind noise so interior of car will be protected and noise level will be at a minimum
CRITERION:	Can test vehicle using proper procedures to locate water leaks and seal leaks with proper sealer Can locate dust leaks by visual means and adjust or replace seals to eliminate leak Can determine general cause of wind noise and determine best procedure for locating noise and cause Can use proper procedure and locate wind noise Can take corrective action to eliminate or reduce wind noise to acceptable level
SKILL/PROCESS:	1. Conduct test to determine type of leak or noise 2. Make repairs or adjustments to eliminate noise 3. Clean up after repairs and dry 4. Perform test to determine if problem has been eliminated
KNOWLEDGE/THEORY:	1. Knows how to perform visual inspection for: a. Proper alignment of panels and components b. Damaged or misaligned weatherstrip c. Omission of sealer from body joints and seams d. Missing body plugs and grommets e. Stopped up body drains causing overflow in interior 2. Knows methods of conducting tests to locate leaks and noises a. Water test b. Chalk c. Powder d. Paper drag test e. Pressurize vehicle with heater blower or air hose f. Mechanics stethoscope with hose g. Small hose for listening h. Electronic detector and tone generator i. Road test j. Cover with tape or strip caulk 3. Knows how to make adjustments for proper alignment of components 4. Knows how to replace or shim weatherstrip for proper fit 5. Knows how to select and use proper adhesives and sealers to eliminate leaks

6. Knows procedures to dry and clean up after repairs are complete
7. Knows how to touch up paint in repair areas
8. Knows how to road test for noise and leaks

**VALUE/ATTITUDE
CONCEPTS:**

Understands the importance of eliminating leaks and noises to prevent further damage to vehicle and for customer comfort and satisfaction

TASK AREA:	Metalworking
TASK #83:	Installs solid roof panels
COMPETENCY:	Install roof panel and component parts so panels are aligned and do not leak
CRITERION:	Can remove all components attached to roof panel following correct procedures without damage to components and can store in safe place while work is performed Can rough align body shell before removing damaged roof panel Can cut and remove roof panel without damage to body shell Can cut and fit new panel and align panel for welding in place Can weld panel in place so welds form a structurally sound joint Can properly finish and seal joints to acceptable appearance Can prepare roof panel for replacement of all components that attach to the panel Can replace all components that attach to the roof panel so appearance and weatherproofing are acceptable to customer
SKILL/PROCESS:	1. Obtain correct repair parts and materials needed 2. Place car in repair area 3. Disconnect battery 4. Remove interior trim, seats, mats, belts, exterior trim, glass, weatherstripping, etc., as needed and store 5. Remove vinyl cover if applicable 6. Cover instrument panel, steering wheel, etc., to protect 7. Align body opening, pillars, and components 8. Locate rough cuts and remove roof panel 9. Remove old spot welds and prepare joints for new panel 10. Fit and clamp new panel in place and check alignment 11. Weld in place 12. Grind welds for finishing 13. Fill joints as needed 14. Apply primer-surfacer to areas needed

15. Weatherproof with proper sealer
16. Refinish (trim out) all openings
17. Replace all removed components and align
18. Leak test
19. Refinish panel
20. Install vinyl cover if required
21. Test that all removed components operate properly
22. Clean up

KNOWLEDGE/THEORY:

1. Knows how to identify and obtain repair parts, materials, equipment, and tools required
2. Knows how to look up service information
3. Knows how to follow proper procedures and take safety precautions to avoid personal injury or damage to vehicle
4. Knows how to remove and store hardware, trim, glass, and weatherstripping and protect components not removed
5. Knows how to remove and store vinyl roof covers
6. Knows how to measure and align body openings, align or replace pillars, roofrails, headers, and reinforcing members
7. Knows how to use body jacks and pulling equipment and attachments properly and safely
8. Knows how to determine removal procedures and how to use tools and equipment needed
9. Knows how to remove old spot welds and prepare joints for welding
10. Knows how to secure panel in place in proper alignment
11. Knows how to set up and use welding equipment safely
12. Knows how to take precautions against fire
13. Knows procedures for welding in place to minimize heat distortion
14. Knows how to clean welds and joints to be filled
15. Knows how to fill with plastic or body solder
16. Knows how to finish filled areas to proper contour
17. Knows how to apply masking
18. Knows how to mix and apply primer-surfacer materials
19. Knows how to use proper sealing materials to weatherproof
20. Knows how to prepare and apply refinishing materials
21. Knows how to install hardware, trim, glass and weatherstripping
22. Knows methods of conducting leak tests
23. Knows how to install vinyl roof cover
24. Knows how to make check and tests to insure proper operation of all components
25. Knows how to clean interior and exterior

VALUE/ATTITUDE
CONCEPTS:

Understands the importance of proper fit of roof panel to side rails and glass openings and the importance of preventing damage to area and component parts

TASK AREA:	Accessories
TASK #83A:	Repairs or replaces sunroof and components
COMPETENCY:	Repair or replace sunroof panel and component parts so sunroof is aligned, operates properly, and is weatherproof when closed
CRITERION:	Can determine extent of damage and components to be removed to make repairs or replace panel Can remove moldings and weatherstrippings, mechanisms, and damaged sunroof panel preventing additional damage to vehicle Can replace components, adjust to proper alignment so mechanisms work freely to open and close panel so panel is weatherproof when closed
SKILL/PROCESS:	1. Visually inspect roof and analyze for repair or replacement 2. Obtain tools and materials for selected procedure 3. Protect car interior 4. Rough align related parts 5. Remove moldings, weatherstrips, and control mechanisms 6. Remove damaged parts 7. Straighten and align parts to be repaired 8. Trim paint new and repaired parts 9. Install new and repaired parts and mechanisms 10. Refinish as needed 11. Install moldings and weatherstrip 12. Check for proper operation and leaks 13. Make adjustments to assure proper operation and seal against leaks 14. Clean up
KNOWLEDGE/THEORY:	1. Knows how to find proper service information 2. Knows how to obtain tools, parts, and materials required 3. Knows how to remove, store, and protect related parts and interior trim 4. Knows how to disassemble sunroof and mechanisms 5. Knows how to paint replacement parts as required 6. Knows how to repair or replace damaged parts and reassemble 7. Knows how to replace assembly and adjust all components for proper alignment and operation 8. Knows how to reassemble all related parts 9. Knows how to conduct leak test and adjust or repair as needed to eliminate leaks 10. Knows how to clean
VALUE/ATTITUDE CONCEPTS:	Understands the importance of maintaining original contours of surface and preventing damage to area and component parts

TASK AREA:	Accessories
TASK #83B:	Repairs or replaces T-top roof panel and component parts
COMPETENCY:	Repair or replace T-top roof panels and component parts so panels align and secure in place and are weatherproof
CRITERION:	Can determine extent of damage and components to be removed to repair Can remove moldings, weatherstripping, mechanisms, and T-top panels without additional damage to the vehicle Can repair or replace components, adjust to proper alignment so locking mechanism secures and panel is weatherproof when in place
SKILL/PROCESS:	1. Inspect and determine damage 2. Secure car in proper position 3. Obtain proper parts to be replaced 4. Obtain proper tools to make repairs 5. Remove component parts 6. Rough out inner panels 7. Remove roof panel and trim lapped panel 8. Align and repair inner panels and channels 9. Clamp roof panel in proper place 10. Weld needed joints 11. Install and adjust locking devices 12. Recheck for proper alignment to adjust panels 13. Grind weld and prepare for filling 14. Fill weld joints as needed 15. Finish filled joints and prepare for primer-surfacer 16. Spray primer-surfacer 17. Seam seal lap joints 18. Prepare for color coat 19. Refinish roof panel
KNOWLEDGE/THEORY:	1. Knows how to find proper service information 2. Knows how to obtain tools, parts, and materials required 3. Knows how to remove, store, and protect related parts and interior trim 4. Knows how to disassemble T-top and mechanisms 5. Knows how to paint replacement parts as required 6. Know how to repair or replace damaged parts and reassemble 7. Knows how to replace assembly and adjust all components for proper alignment and operation 8. Knows how to reassemble all related parts 9. Knows how to conduct leak test and adjust or repair as needed to eliminate leaks 10. Knows how to clean

VALUE/ATTITUDE
CONCEPTS:

Understands the importance of maintaining original
contours of surface and preventing damage to area
and component parts

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TASK AREA:	Painting
TASK #84:	Identifies paint problems
COMPETENCY:	Recognize paint problems, identify common causes, and prescribe preventive measures and corrective procedures to correct paint to customer's satisfaction
CRITERION:	Can identify type of paint and whether paint is an original or repainted finish Can identify different types of paint problems Can identify possible cause of paint problems Can recommend proper corrective action at least cost
SKILL/PROCESS:	1. Determine type of paint 2. Identify problem and possible causes 3. Select repair procedures 4. Select repair materials 5. Plan corrective action 6. Estimate cost of repairs
KNOWLEDGE/THEORY:	1. Knows how to identify paint by color code 2. Knows how to perform test for type with lacquer thinner 3. Knows how to identify paint problems and possible causes 4. Knows proper procedures to correct problems 5. Knows how to select and use materials required properly 6. Knows how to estimate materials and labor required
VALUE/ATTITUDE CONCEPTS:	Understands the importance of all repainted surfaces meeting factory specifications Understands and appreciates customer's apprehension and concern

TASK AREA:	Painting
TASK #85:	Applies striping
COMPETENCY:	Apply striping with appropriate color material to replace original stripes according to original pattern or to owner's satisfaction
CRITERION:	Can clean and prepare surface to accept striping materials Can select proper materials and color for striping Can lay out pattern and location of stripe according to original pattern or to owner's satisfaction Can stripe using correct tape materials or using paint so stripe is smooth, proper width, aligned, located properly, and of correct intensity
SKILL/PROCESS:	1. Clean and prepare surface 2. Select method and materials for stripes 3. Locate and lay out stripe 4. Mask for painting on stripes or set up guides 5. Apply stripe 6. Remove masking or guides 7. Cure 8. Clean
KNOWLEDGE/THEORY:	1. Knows how to identify color, width, and type of stripe 2. Knows how to select striping materials 3. Knows how to clean and prepare surface 4. Knows how to lay out stripes using striping tape 5. Knows how to prepare surface using scuffing pad 6. Knows how to prepare and apply painted stripes 7. Knows how to lay out tracks for striping with paint roller 8. Knows how to prepare paint 9. Knows how to prepare and adjust roller equipment 10. Knows how to apply painted stripe using roller 11. Knows how to clean and store equipment 12. Knows how to remove guides and masking 13. Knows how to clean up
VALUE/ATTITUDE CONCEPTS:	Understands customer's personal preference for decor

TASK AREA:	Welding
TASK #86:	Repairs plastic parts
COMPETENCY:	Repair plastic parts by welding process so joint is structurally sound and can be refinished to original contour and color
CRITERION:	Can identify plastic material and process for repairing and select materials to be used in repair Can prepare joint by grinding, grooving, or burling to fit parts for welding Can weld so joint is structurally sound and can be finished to original contour and color
SKILL/PROCESS:	1. Select correct materials for repair 2. Clean area to be repaired 3. Fit and prepare joint for weld 4. Join parts with correct welding process 5. Cure parts 6. Grind to proper contour 7. Sand for refinishing 8. Refinish to match
KNOWLEDGE/THEORY:	1. Knows use of hand tools 2. Knows how to determine if part should be repaired or replaced 3. Knows how to select and use die grinder and plastic welder 4. Knows use of clamping tools and how to determine type of material to be welded 5. Knows use of body tools and clamps 6. Knows use of die grinder 7. Knows use of plastic welder 8. Knows use of hand tools and equipment 9. Knows how to clean up and store tools properly
VALUE/ATTITUDE CONCEPTS:	Understands the importance of following proper procedures and practices in repairing plastic parts

TASK AREA:	Accessories
TASK #87:	Removes and replaces vinyl tops
COMPETENCY:	Remove vinyl top without damaging material and vehicle and replace vinyl top so top is aligned properly, smooth, free of air bubbles, and secured properly to metal surfaces
CRITERION:	Can remove vinyl tops without damaging material Can align and secure vinyl top to vehicle
SKILL/PROCESS:	1. Remove trim around vinyl top 2. Remove any fasteners securing vinyl material 3. Remove vinyl by pulling and applying heat as necessary 4. Store and/or protect vinyl top when top is to be reused 5. Remove adhesive with correct chemical agent 6. Repair damaged surfaces as required 7. Refinish surface as required 8. Prepare vinyl by warming to make flexible 9. Align vinyl top on surface and mark or secure with temporary fastening 10. Fold back to allow for application of adhesive 11. Apply adhesive 12. Place top over adhesive keeping alignment and smoothing from center to edges 13. Apply adhesive to remaining portion of surface 14. Place top in position and smooth from center to edges 15. Pull tight and smooth all surfaces 16. Fasten edges 17. Replace moldings and trim 18. Clean vinyl surfaces 19. Wax vinyl surfaces
KNOWLEDGE/THEORY:	1. Knows how to identify top by manufacturer's trim code 2. Knows how trim molding is fastened and removed 3. Knows how to soften vinyl by heating 4. Knows types of solvents to use in removing adhesives 5. Knows types of adhesives and how to apply the adhesive to the surfaces 6. Knows how to clean and wax vinyl
VALUE/ATTITUDE CONCEPTS:	Understands reasons for doing work correctly and to customer's satisfaction

CURRICULUM MODEL

This curriculum model provides a curriculum description, courses by quarters, and course descriptions with the suggested tasks to be taught in each course. This model is provided as an example of how the competency-based curriculum might incorporate the teaching of each task in the curriculum. There are, certainly, many different ways to include the organization of the competencies into courses. This model emphasizes the integration of the subjects and provides for an introduction and skill building as the student progresses through the program. This model is well suited to the program that emphasizes full-time attendance and is designed to prepare for jobs where the individual is required to be knowledgeable in all areas of body work.

A second model curriculum is being developed that organizes the tasks into subject-centered courses such as: metalwork, painting, estimating, body filling, frame straightening, alignment, welding and soldering. This model curriculum will be adaptable where there is a need to fill specialized employment opportunities and to attract the part-time student who wishes to upgrade or update existing skills or prepare for employment in a specialized job.

V-001 AUTOMOTIVE BODY REPAIR

Curriculum Description:

The Automotive Body Repair curriculum provides training in the use of the equipment and materials of the auto body mechanic trade. The student studies the construction of the automobile body and techniques of auto body repairing, rebuilding, and refinishing.

Repairing, straightening, aligning, metal finishing and painting of automobile bodies and frames are typical jobs performed. Job titles include automobile body repairman, automotive painter and frame and chassis repairman.

Dictionary of Occupational Titles - Job Titles Identified by Quarters

Completion of first quarter:	806.684-038 Automobile Accessories Installer
Completion of second quarter:	620.261-018 Automobile-Repair-Service Estimator 241.267-014 Appraiser, Automobile Damage
Completion of third quarter:	825.381-014 Automatic Window, Seat, and Top Lift Repairer 845.684-014 Painter Helper, Automotive 845.381-014 Painter, Transportation Equipment
Completion of fourth quarter:	807.361-010 Automobile Body Customizer 807.381-010 Automobile Body Repairer

V-001 AUTOMOTIVE BODY REPAIR

SUGGESTED CURRICULUM BY QUARTERS

		<u>Hours Per Week</u>			<u>Quarter</u>
<u>Course Title</u>		<u>Class</u>	<u>Lab</u>	<u>Shop</u>	<u>Hours</u>
<u>FIRST QUARTER</u>					
AUT 1111	Auto Body Repair	5	0	15	10
MAT 1101	Fundamentals of Mathematics	5	0	0	5
ENG 1101	Reading Improvement	2	0	0	2
WLD 1101	Basic Gas Welding	0	0	3	1
		12	0	18	18
<u>SECOND QUARTER</u>					
AUT 1112	Auto Body Repair	5	0	12	9
WLD 1105	Auto Body Welding	1	0	3	2
PHY 1101	Applied Science	3	2	0	4
ENG 1102	Communications Skills	3	0	0	3
		12	2	15	18
<u>THIRD QUARTER</u>					
AUT 1113	Auto Body Repair	5	0	12	9
PSY 1101	Human Relations	3	0	0	3
AUT 1120	Automotive Electrical Systems	3	0	3	4
PHY 1102	Applied Science	3	2	0	4
		14	2	15	20
<u>FOURTH QUARTER</u>					
AUT 1114	Auto Body Repair	5	0	15	10
BUS 1103	Small Business Management	3	0	0	3
AHR 1101	Automotive Air Conditioning	3	0	3	4
		11	0	18	17
TOTAL QUARTER HOURS CREDIT					73

AUT 1111 AUTO BODY REPAIR

	<u>Class</u>	<u>Lab</u>	<u>Shop</u>	<u>Quarter Hours Credit</u>
<u>Course Description</u>	5	0	15	10

Upon completion of this course the person will have a basic understanding and introductory knowledge and skills in repairing and restoring an automobile body. The person will be able to make minor repairs by straightening, filling with body fillers, and spot painting with lacquers. The person will also have a knowledge of the basic components of the automobile body and will be competent to remove and replace moldings and trim; to make minor adjustments to properly fit doors, deck and hood lids; and to replace and adjust glass and trim.

Tasks

The following tasks will be taught in this course with the basic competency completed. The student will gain additional experience throughout the remaining courses.

- #75 Cleans up and prepares a car for delivery
- #75A Road tests and checks car for delivery
- #60 Aims headlamp
- #55 Removes and replaces inside soft trim
- #78 Repairs and replaces seat tracks and frames
- #39A Installs and aligns deck lid
- #39 Installs and aligns door
- #38 Installs stationary glass
- #37 Installs movable glass
- #50 Repairs or replaces and tests cooling system components
- #54 Repairs and replaces transmission cooling lines
- #58 Repairs vinyl components
- #87 Removes and replaces vinyl tops
- #80 Replaces and overhauls bumper assemblies
- #82 Locates and eliminates leaks and noises
- #32 Files and picks sheet metal to straighten
- #26 Fills with body plastics

These tasks will be introduced in this course and will continue to be taught in additional courses to develop the competency required of the auto body mechanic.

- #64 Removes and replaces exterior moldings and ornamentation
- #42 Installs and aligns front sheet metal and panels

- #51 Replaces radiators and radiator supports
- #29/30/31 Prepares damaged panel for straightening or filling, roughs out damaged area, and shrinks stretched metal
- #28 Analyzes damaged area
- #12 Compounds and buffs a finished or refinished surface
- #61 Cleans and maintains spray equipment
- #11 Cleans and prepares a surface for undercoats
- #68 Masks before painting
- #14/15 Selects correct materials; mixes and properly applies undercoat materials and sealers
- #34 Sands surface with abrasive material and equipment in preparation for topcoat
- #18 Spot blends a lacquer finish
- #85 Applies striping
- #59 Installs decals
- #86 Repairs plastic parts

AUT 1112 AUTO BODY REPAIR

	<u>Class</u>	<u>Lab</u>	<u>Shop</u>	<u>Quarter Hours Credit</u>
<u>Course Description</u>	5	0	12	9

Upon completion of this course the body mechanic will be able to analyze the damage to the automobile and make an accurate estimate of the cost to repair by identifying parts to be replaced or repaired and cost of labor, materials, and parts. The mechanic will be able to repair or replace panels or parts of panels, replace rear clips, and remove and replace roof panels.

Tasks

The following tasks will be taught in this course with the basic competency completed. The student will gain additional experience throughout the remaining courses.

- #56 Estimates collision repair costs
- #71 Writes repair orders and prepares statement of cost
- #25 Fills with body solder
- #66 Installs outer door panels
- #79 Removes and replaces fuel tank and checks lines for leaks
- #35 Repairs fiberglass panel, scratches, gouges, and cracks
- #36 Removes and replaces fiberglass panel
- #62 Installs partial panels using steel, fiberglass, or other materials
- #65 Repairs rusted areas

- #67 Repairs and installs rocker panels
- #57 Replaces quarter panel
- #41 Installs rear clip
- #83 Installs solid roof panels
- #83A Repairs or replaces sun roof and components
- #83B Repairs or replaces T-top roof panel and component parts

These tasks will be introduced in this course and will continue to be taught in additional courses to develop the competency required of the auto body mechanic.

- #48 Locates and identifies suspension damage
- #49 Locates and identifies frame damage

These tasks will continue to be taught in the course and the following courses to develop the competency required of the auto body mechanic.

- #42 Installs and aligns front sheet metal and panels
- #34 Sands surface with abrasive material and equipment in preparation for topcoat

These tasks are continued from the previous course to develop the competency required of the auto body mechanic.

- #64 Removes and replaces exterior moldings and ornamentation
- #51 Replaces radiators and radiator supports
- #29/30/31 Prepares damaged panel for straightening or filling, roughs out damaged area, and shrinks stretched metal
- #28 Analyzes damaged area
- #86 Repairs plastic parts

AUT 1113 AUTO BODY REPAIR

	<u>Class</u>	<u>Lab</u>	<u>Shop</u>	<u>Quarter Hours Credit</u>
<u>Course Description</u>	5	0	12	9

Upon completion of this course the body mechanic will be able to paint an automobile with lacquers and enamels. The person will be able to prepare the automobile for painting by repairing body damage, sanding, masking, priming, sealing, and will be able to paint the entire automobile body or to spot paint and blend to match.

Tasks

The following tasks will be taught in this course with the basic competency completed. The student will gain additional experience throughout the remaining courses.

- #84 Identifies paint problems
- #16 Applies an overall lacquer finish
- #13 Identifies, applies, and spot blends enamels
- #17 Applies an overall enamel finish

These tasks are continued from the previous courses to develop the competency required of the auto body mechanic.

- #12 Compounds and buffs a finished or refinished surface
- #61 Cleans and maintains spray equipment
- #11 Cleans and prepares a surface for undercoats
- #68 Masks before painting
- #14/15 Selects correct materials; mixes and properly applies undercoat materials and sealers
- #34 Sands surface with abrasive material and equipment in preparation for topcoat
- #18 Spot blends a lacquer finish
- #85 Applies striping
- #59 Installs decals

AUT 1114 AUTO BODY REPAIR

	<u>Class</u>	<u>Lab</u>	<u>Shop</u>	<u>Quarter Hours Credit</u>
<u>Course Description</u>	5	0	15	10

Upon completion of this course the body mechanic will be able to repair frame damage to the automobile body by replacing or straightening the frame and body components and making necessary alignments of the body components, frame, and suspension system. The person will be able to utilize body straightening equipment.

Tasks

The following tasks will be taught in this course with the basic competency completed. The student will gain additional experience throughout the remaining courses.

- #44 Checks and repairs frame damage
- #45 Replaces damaged frame components
- #40 Aligns body shell

- #63 Utilizes lifting equipment
- #43 Aligns body on frame
- #46 Aligns rear end suspension parts
- #47 Aligns front end suspension parts
- #76 Diagnoses and replaces steering column and steering components

These tasks are continued from the previous courses to develop the competency required of the auto body mechanic.

- #42 Installs and aligns front sheet metal and panels
- #48 Locates and identifies suspension damage
- #49 Locates and identifies frame damage

WLD 1101 BASIC GAS WELDING

	<u>Class</u>	<u>Lab</u>	<u>Shop</u>	<u>Quarter Hours Credit</u>
<u>Course Description</u>	0	0	3	1

This course includes welding demonstrations by the instructor and practice by students in the welding shop. Safe and correct methods of assembling and operating the welding equipment are emphasized. Practice will be given for surface welding; bronze welding, silver soldering, and flame-cutting methods applicable to mechanical repair work.

Tasks

- #20 Flame cuts metal with the oxyacetylene cutting process
- #24 Brazes sheet metal with the oxyacetylene welding process
- #19 Welds sheet metal with the oxyacetylene welding process

WLD 1105 AUTO BODY WELDING

	<u>Class</u>	<u>Lab</u>	<u>Shop</u>	<u>Quarter Hours Credit</u>
<u>Course Description</u>	1	0	3	2

This course includes welding practices on material applicable to the installation of body panels and repairs to doors, fenders, hoods, and deck lids. The students runs beads, does butt and fillet welding, and performs tests to detect strength and weaknesses of welding joints. Safety procedures are emphasized throughout the course.

Tasks

- #21 Welds heavy gauge metal with the arc welding process

AUT 1120 AUTOMOTIVE ELECTRICAL SYSTEMS

	<u>Class</u>	<u>Lab</u>	<u>Shop</u>	<u>Quarter Hours Credit</u>
<u>Course Description</u>	3	0	3	4

Upon completion of this course the auto body mechanic will be able to read and follow wiring diagrams to replace, repair, and install wiring and electrical components of the automobile. The person will be able to test electrical circuits and components to determine damage or the cause of malfunctioning and to make decisions on the best method of restoring to proper operation.

Tasks

- #77 Checks and repairs electrical circuits
- #81 Services battery safely

AHR 1101 AUTOMOTIVE AIR CONDITIONING

	<u>Class</u>	<u>Lab</u>	<u>Shop</u>	<u>Quarter Hours Credit</u>
<u>Course Description</u>	3	0	3	4

This course includes a general introduction to the principles of refrigeration; study of the assembly of the components and connections necessary in the mechanisms, the methods of operation, and control; and teaching proper handling of refrigerants in charging the system. Use of testing equipment in diagnosing trouble, conducting efficiency tests and general maintenance work is also covered in the course.

Tasks

- #52 Replaces air conditioning components
- #53 Recharges air conditioning system with freon

FUNDAMENTALS OF MATHEMATICS. Practical number theory. Analysis of basic operations: addition, subtraction, multiplication and division. Fractions, decimals, powers and roots, percentages, ratio and proportion, plane and solid geometric figures used in industry; measurement of surfaces and volumes. Introduction to algebra used in trades. Practice in depth.

PREREQUISITE: None

	<u>Class Hours</u>	<u>Lab Hours</u>	<u>Credit Hours</u>
MAJOR DIVISIONS	5	0	5
I. Introduction to the set of real numbers and the base - 10			
II. Common fractions and decimal fractions			
III. Powers and roots			
IV. Percentages			
V. Rules and formulas			
VI. Ratio and proportion			
VII. Geometric figures			
VIII. Introduction to algebra			

READING IMPROVEMENT is designed to improve the student's ability to read rapidly and accurately. Class drill is used to broaden the span of recognition, to increase eye coordination and word group recognition and to train for comprehension in larger units. Reading weaknesses are analyzed for improvement and principles of vocabulary are stressed.

PREREQUISITE: None

	<u>Class Hours</u>	<u>Lab Hours</u>	<u>Credit Hours</u>
MAJOR DIVISIONS	2	0	2
I. Introduction			
II. Common faults of slow readers, and their correction			
III. Broadening the span of recognition			
IV. Accuracy of interpreting symbol forms			
V. Apprehension and eye-hand coordination			
VI. Building word recognition ability			
VII. Numbers and letters			
VIII. Vocabulary building			
IX.. Continuing improvement of speed and comprehension			

APPLIED SCIENCE is an introduction to physical principles and their application in industry. Topics in this course include measurement; properties of solids, liquids, and gases; basic electrical principles.

PREREQUISITE: None

	<u>Class Hours</u>	<u>Lab Hours</u>	<u>Credit Hours</u>
MAJOR DIVISIONS	3	2	4
I. Types of measurement			
II. Development and use of the "scientific method"			
III. Principles and uses of machines			
IV. Solids, liquids, and gases			
V. Types of energy			

ENG 1102

COMMUNICATION SKILLS is designed to promote effective communication through correct language usage in speaking and writing.

PREREQUISITE: ENG 1101

	<u>Class Hours</u>	<u>Lab Hours</u>	<u>Credit Hours</u>
MAJOR DIVISIONS	3	0	3
I. Sentence structure			
II. Written expression			
III. Talking and listening			
IV. The report form			

HUMAN RELATIONS is a study of basic principles of human behavior. The problems of the individual are studied in relation to society, group membership, and relationships within the work situation.

PREREQUISITE: None

	<u>Class Hours</u>	<u>Lab Hours</u>	<u>Credit Hours</u>
MAJOR DIVISIONS	3	0	3
I. Basic principles of human behavior			
II. Striving to understand human relations			
III. Behavior and problems in living			
IV. Striving to become an effective worker			

APPLIED SCIENCE is the second in a series of two courses of applied physical principles. Topics introduced in this course are heat and thermometry, and principles of force, motion, work, energy, and power.

PREREQUISITE: PHY 1101

	<u>Class Hours</u>	<u>Lab Hours</u>	<u>Credit Hours</u>
MAJOR DIVISIONS	3	2	4
I. Heat and thermometry			
II. Thermal expansion			
III. Change of phase			
IV. Transfer of heat			
V. Heat and work			
VI. Common industrial engines			
VII. Physical concepts applicable to machines and mechanisms			
VIII. Energy and work			
IX. Simple machines			
X. Screw thread			
XI. Gear trains, simple and compound			
XII. Simple and compound machines			
XIII. Mechanical power transmission and effects of friction and lubrication			

SMALL BUSINESS MANAGEMENT is designed to introduce the student to the operations of a small business. This course is designed to help the prospective owner of a small business plan, organize and finance a business; prepare budgets and forecasts; recruit, select and train employees; and market a product or service.

PREREQUISITE: None

	<u>Class Hours</u>	<u>Lab Hours</u>	<u>Credit Hours</u>
MAJOR DIVISIONS	3	0	3
I. The Free Enterprise System			
II. Problems of small business			
III. Business ownership			
IV. Determining business objectives			
V. Location, layout, and physical facilities			
VI. Forecasting sales			
VII. Estimating operating expenses			
VIII. Financing			
IX. Record keeping			
X. Legal transactions			
XI. Federal, state, and local rules and regulations			
XII. Personnel management			
XIII. Sales promotion			



APPENDIX A

DEPARTMENT OF
COMMUNITY COLLEGES
NORTH CAROLINA STATE BOARD OF EDUCATION
RALEIGH 27611

July 14, 1977

Dear Colleague:

The Department of Community Colleges is conducting a project to evaluate and update automobile body mechanics programs in the system. The first step in this project was to identify appropriate positions that may be held by graduates of this program.

The second step in this project is to identify the tasks and the level of competency needed in order to perform satisfactorily as an automobile body mechanic. The enclosed is an inventory asking for your opinion about which competencies in this program will be needed. Your opinion on this inventory will provide guidance for the evaluating and updating of the programs in the community college system.

You can assist in this project by completing the enclosed inventory. Please return the inventory in the stamped, self-addressed envelope. Your responses will be compiled with the responses of other individuals completing the inventory, with no individual responses identified. Please return by August 1, 1977.

Thank you very much for assisting in this project.

Sincerely,

A handwritten signature in dark ink, appearing to read "Roger G. Worthington".

Roger G. Worthington, Director
Program Development

RGW:dr

COMPETENCY BASED AUTOMOBILE BODY CURRICULUM STUDY

TASKS PERFORMED BY AUTOMOBILE BODY MECHANICS

The following is a list of tasks which may or may not be performed by persons in automotive body repair occupations. Please use the following key to make your evaluation of the importance of each task. The person should possess:

1. no competency in this activity.
2. slight competency in this activity.
3. moderate competency in this activity.
4. considerable competency in this activity.
5. complete competency in this activity.

Please answer all questions. There are no right or wrong answers. What is important is how you rate each competency.

Please circle the rating (1-2-3-4-5) which best indicates your feelings as to the importance of each item. At times your exact feelings will not be represented, but select the answer nearest your feelings and do not omit any items.

1
2
3
4
5
6
7
8
9
10

no
slight
moderate
considerable
complete

Definition: Competent (Webster) 1. Well qualified; capable; fit.

Competency (Webster) 2. Condition or quality of being competent.

TASKS

11.	1 2 3 4 5	Cleans and prepares a surface for refinishing.
12.	1 2 3 4 5	Compound and buff a finished or refinished surface.
13.	1 2 3 4 5	Identifies, applies and spot blends enamels.
14.	1 2 3 4 5	Selects correct materials, mixes and properly applies primer materials.
15.	1 2 3 4 5	Selects correct materials, mixes and properly applies sealers.
16.	1 2 3 4 5	Applies an over-all lacquer finish.
17.	1 2 3 4 5	Applies an over-all enamel finish.
18.	1 2 3 4 5	Spot blends a lacquer finish.
19.	1 2 3 4 5	Welds sheet metal with the oxyacetylene welding process.
20.	1 2 3 4 5	Flame cuts metal with the oxyacetylene cutting process.

	no	slight	moderate	considerable	complete	TASKS
21.	1	2	3	4	5	Welds heavy gauge metal with the arc welding process.
22.	1	2	3	4	5	Welds auto metals with spot welding process.
23.	1	2	3	4	5	Welds metals with the gas-metal arc (MIG) process.
24.	1	2	3	4	5	Braze sheet metal with the oxyacetylene welding process.
25.	1	2	3	4	5	Fills with body solder.
26.	1	2	3	4	5	Fills with body plastics.
27.	1	2	3	4	5	Uses hand tools for metal working.
28.	1	2	3	4	5	Analyzes damaged area.
29.	1	2	3	4	5	Prepares damaged panel for straightening or filling.
30.	1	2	3	4	5	Roughs out damaged area.
31.	1	2	3	4	5	Shrinks stretched metal.
32.	1	2	3	4	5	Files and picks sheet metal.
33.	1	2	3	4	5	Uses a disc sander.
34.	1	2	3	4	5	Sands surface with proper abrasive material and equipment in preparation for top coat.
35.	1	2	3	4	5	Repairs fiber glass panel, scratches, gouges and cracks.
36.	1	2	3	4	5	Removes and replaces fiberglass panel.
37.	1	2	3	4	5	Installs door, quarter and side glass.
38.	1	2	3	4	5	Installs back glass and windshield.
39.	1	2	3	4	5	Aligns doors and deck lid.
40.	1	2	3	4	5	Aligns body shell.
41.	1	2	3	4	5	Installs rear clip.
42.	1	2	3	4	5	Installs and aligns front sheet metal.
43.	1	2	3	4	5	Aligns body on frame.
44.	1	2	3	4	5	Checks and repairs frame damage.
45.	1	2	3	4	5	Replaces damaged frame components.

						<u>TASKS</u>
	no	slight	moderate	considerable	complete	
46.	1	2	3	4	5	Aligns rear end suspension parts.
47.	1	2	3	4	5	Aligns front end suspension parts.
48.	1	2	3	4	5	Locates and identifies suspension damage.
49.	1	2	3	4	5	Locates and identifies frame damage.
50.	1	2	3	4	5	Repairs or replaces and tests cooling system components.
51.	1	2	3	4	5	Replaces radiators and radiator supports.
52.	1	2	3	4	5	Replaces air conditioning components.
53.	1	2	3	4	5	Recharges air conditioning system with freon.
54.	1	2	3	4	5	Repairs and replaces transmission cooling lines.
55.	1	2	3	4	5	Removes and replaces inside soft trim.
56.	1	2	3	4	5	Estimates collision repair costs.
57.	1	2	3	4	5	Replaces quarter panel.
58.	1	2	3	4	5	Repairs vinyl components.
59.	1	2	3	4	5	Installs decals.
60.	1	2	3	4	5	Aims headlights.
61.	1	2	3	4	5	Cleans and maintains spray equipment.
62.	1	2	3	4	5	Installs partial panels using steel, fiberglass or other materials.
63.	1	2	3	4	5	Utilizes hydraulic jacking equipment.
64.	1	2	3	4	5	Removes and replaces exterior moldings and trim.
65.	1	2	3	4	5	Repairs rusted areas.
66.	1	2	3	4	5	Installs outer door panels.
67.	1	2	3	4	5	Repairs and installs rocker panels.
68.	1	2	3	4	5	Masks before painting.
69.	1	2	3	4	5	Identifies body parts.

	no	slight	moderate	considerable	complete	TASKS
70.	1	2	3	4	5	Practices safety procedures.
71.	1	2	3	4	5	Writes repair orders.
72.	1	2	3	4	5	Customer and co-worker relations.
73.	1	2	3	4	5	Uses shop manuals and technical references.
74.	1	2	3	4	5	Proper treatment of bare metal.
75.	1	2	3	4	5	Cleans up and prepares a car for delivery.
76.	1	2	3	4	5	Diagnoses and replaces steering column and steering components.
77.	1	2	3	4	5	Checks and repairs electrical circuits.
78.	1	2	3	4	5	Repairs and replaces seat tracks and frames.
79.	1	2	3	4	5	Removes and replaces gas tank and checks lines for leaks.
80.	1	2	3	4	5	Replaces and overhauls bumper assemblies.
81.	1	2	3	4	5	Services battery safely.

PLEASE ADD TO THIS LIST ANY OTHER COMPETENCIES YOU FEEL AUTOMOBILE BODY MECHANICS MAY NEED AND RANK EACH ONE YOU ADD.

82. 1 2 3 4 5
83. 1 2 3 4 5
84. 1 2 3 4 5
85. 1 2 3 4 5
86. 1 2 3 4 5

PLEASE COMPLETE INFORMATION ON THE NEXT PAGE.

Curriculum No.

V	0	0	1
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Survey No.

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Please provide the following information.

1. Are you a:

- A. ☐ Mechanic
- B. ☐ Shop Foreman
- C. ☐ Shop Supervisor
- D. ☐ Shop Owner
- E. ☐ Service Manager
- F. ☐ Teacher

2. In which of the following types of firms are you now employed?

- A. ☐ Independently-owned and operated
- B. ☐ Franchised Dealer
- C. ☐ Community College or Technical Institute

3. How many body shop employees are there in the firm in which you are employed?

- A. ☐ Up to 5
- B. ☐ 5 to 10
- C. ☐ 10 to 25
- D. ☐ Over 25

APPENDIX B - SURVEY DATA ANALYSIS

Orig. No.	Rank	TASKS	Total No. Responses (88)	MEAN					FREQUENCY (N) & PCT. OF FREQUENCY (ADJ.)									
				Group	Emplr's (N)	Emple's (N)	Educ's (N)		1		2		3		4		5	
									(N)	Pct.	(N)	Pct.	(N)	Pct.	(N)	Pct.	(N)	Pct.
70	1	Practices safety procedures.	81	4.827	4.966 (29)	4.667 (30)	4.889 (18)		0		0		3		8		70	
11	2	Cleans and prepares a surface for refinishing.	87	4.747	4.690 (29)	4.800 (35)	4.737 (19)		0		1		4		11		71	
26	3	Fills with body plastics.	81	4.741	4.828 (29)	4.667 (30)	4.722 (18)		0		0		2		17		62	
34	4	Sands surface with proper abrasive material and equipment in preparation for top coat.	81	4.716	4.786 (28)	4.677 (31)	4.611 (18)		0		1		4		12		64	
33	5	Uses a disc sander.	82	4.695	4.690 (29)	4.745 (31)	4.778 (18)		0		2		3		13		64	
14	6	Selects correct materials, mixes and properly applies primer materials.	87	4.678	4.793 (29)	4.543 (35)	4.684 (19)		0		0		4		20		63	
39	7	Aligns doors and deck lid.	80	4.650	4.759 (29)	4.690 (29)	4.556 (18)		0		1		3		19		57	
29	8	Prepares damaged panel for straightening or filling.	82	4.634	4.724 (29)	4.581 (31)	4.611 (18)		0		0		7		16		59	
30	8	Roughs out damaged area.	82	4.634	4.724 (29)	4.581 (31)	4.611 (18)		0		1		5		17		59	
57	10	Replaces quarter panel.	88	4.625	4.533 (30)	4.743 (35)	4.579 (19)		1		0		6		17		64	
61	10	Cleans and maintains spray equipment.	88	4.625	4.733 (30)	4.486 (35)	4.632 (19)		0		3		6		12		67	
27	12	Uses hand tools for metal working.	82	4.610	4.690 (29)	4.548 (31)	4.556 (18)		0		1		6		17		58	
42	12	Installs and aligns front sheet metal.	82	4.610	4.828 (29)	4.516 (31)	4.444 (18)		0		0		6		20		56	
68	14	Masks before painting.	88	4.602	4.567 (30)	4.629 (35)	4.632 (19)		1		3		6		10		68	
15	15	Selects correct materials, mixes and properly applies sealers.	88	4.591	4.533 (30)	4.600 (35)	4.632 (19)		1		0		6		20		61	
66	15	Installs outer door panels.	88	4.591	4.633 (30)	4.657 (35)	4.368 (19)		0		0		6		24		58	
74	17	Proper treatment of bare metal.	82	4.573	4.586 (29)	4.484 (31)	4.611 (18)		0		1		7		18		56	
17	18	Applies an over-all enamel finish.	88	4.557	4.500 (30)	4.543 (35)	4.632 (19)		1		1		5		22		59	
65	18	Repairs rusted areas.	88	4.557	4.500 (30)	4.600 (35)	4.526 (19)		0		3		6		18		61	
18	20	Spot blends a lacquer finish.	87	4.552	4.517 (29)	4.571 (35)	4.632 (19)		1		1		7		18		60	
62	21	Installs partial panels using steel, fiber-glas or other materials.	88	4.545	4.500 (30)	4.571 (35)	4.526 (19)		1		0		9		18		60	
64	22	Removes and replaces exterior moldings and trim.	87	4.540	4.621 (29)	4.486 (35)	4.474 (19)		0		2		9		16		60	
80	23	Replaces and overhauls bumper assemblies.	82	4.488	4.621 (29)	4.419 (31)	4.556 (18)		0		3		6		21		52	
40	23	Aligns body shell.	82	4.488	4.586 (29)	4.452 (31)	4.389 (18)		0		1		8		23		50	

CURRICULUM CODE NO. & TITLE														V-001 Auto Body											
Orig. No.	Rank	TASKS	Total No. Responses (88)	MEAN						FREQUENCY (N) & PCT. OF FREQUENCY (ADJ.)															
				Group		Emplr's (N)		Emplee's (N)		Educ's (N)		1		2		3		4		5					
				(N)	Pct.	(N)	Pct.	(N)	Pct.	(N)	Pct.	(N)	Pct.	(N)	Pct.	(N)	Pct.	(N)	Pct.	(N)	Pct.				
67	25	Repairs and installs rocker panels.	88	4.477	4.633	(30)	4.400	(35)	4.421	(19)	0	0	10	26	52										
16	25	Applies an over-all lacquer finish.	88	4.477	4.500	(30)	4.429	(35)	4.526	(19)	1	1	10	19	57										
31	27	Shrinks stretched metal.	82	4.476	4.414	(29)	4.613	(31)	4.333	(18)	0	1	11	18	52										
69	28	Identifies body parts.	88	4.443	4.500	(30)	4.400	(35)	4.474	(19)	1	3	10	16	58										
19	29	Welds sheet metal with the oxyacetylene welding process.	88	4.432	4.533	(30)	4.400	(35)	4.368	(19)	0	1	9	29	49										
37	30	Installs door, quarter and side glass.	82	4.402	4.586	(29)	4.419	(31)	4.111	(18)	0	1	12	22	47										
12	31	Compound and buff a finished or refinished surface.	88	4.398	4.400	(30)	4.486	(35)	4.263	(19)	1	2	13	17	55										
38	32	Installs back glass and windshield.	82	4.390	4.379	(29)	4.387	(31)	4.444	(18)	0	1	15	17	49										
63	33	Utilizes hydraulic jacking equipment.	88	4.375	4.567	(30)	4.143	(35)	4.421	(19)	0	6	8	21	53										
22	34	Welds auto metals with spot welding process.	81	4.370	4.552	(29)	4.233	(32)	4.278	(18)	0	1	14	20	46										
72	35	Customer and co-worker relations.	82	4.366	4.310	(29)	4.387	(31)	4.389	(18)	3	1	8	21	49										
28	36	Analyzes damaged area.	82	4.341	4.379	(29)	4.323	(31)	4.278	(18)	1	2	13	18	48										
24	37	Braze sheet metal with the oxyacetylene welding process.	82	4.280	4.414	(29)	4.258	(31)	4.167	(18)	0	3	11	28	40										
73	37	Uses shop manuals and technical references.	82	4.280	4.345	(29)	4.194	(31)	4.333	(18)	0	1	14	28	39										
32	39	Files and picks sheet metal.	82	4.244	4.276	(29)	4.226	(31)	4.333	(18)	0	2	14	28	38										
43	40	Aligns body on frame.	82	4.207	4.172	(29)	4.323	(31)	4.056	(18)	1	5	15	16	45										
35	41	Repairs fiber glass panel, scratches, gouges and cracks.	82	4.195	4.034	(29)	4.355	(31)	4.167	(18)	0	4	16	22	40										
51	42	Replaces radiators and radiator supports.	88	4.193	4.367	(30)	4.257	(35)	3.737	(19)	3	3	17	16	49										
13	43	Identifies, applies and spot blends enamels.	88	4.170	4.000	(30)	4.200	(35)	4.368	(19)	4	4	14	17	49										
59	44	Installs decals.	88	4.125	4.000	(30)	4.200	(35)	4.105	(19)	3	3	16	24	42										
49	45	Locates and identifies frame damage.	88	4.102	3.800	(30)	4.057	(35)	4.579	(19)	1	5	21	18	42										
36	46	Removes and replaces fiberglass panel.	81	4.086	4.172	(29)	4.167	(30)	3.833	(18)	0	8	18	14	41										
20	47	Flame cuts metal with the oxyacetylene cutting process.	88	4.045	4.033	(30)	4.000	(35)	4.105	(19)	1	5	21	23	38										
44	48	Checks and repairs frame damage.	82	4.037	3.759	(29)	4.226	(31)	4.056	(18)	2	7	16	18	39										

158

Orig. No.	Rank	TASKS	Total No. Responses (88)	MEAN						FREQUENCY (N) & PCT. OF FREQUENCY (ADJ.)									
										1		2		3		4		5	
				Group	Emplr's (N)	Emplye's (N)	Educ's (N)			(N) Pct.	(N) Pct.	(N) Pct.	(N) Pct.	(N) Pct.	(N) Pct.	(N) Pct.	(N) Pct.	(N) Pct.	(N) Pct.
41	49	Installs rear clip.	81	4.025	4.000 (29)	4.129 (31)	3.882 (17)			0	7	17	24	33					
75	50	Cleans up and prepares a car for delivery.	82	3.976	3.759 (29)	3.968 (31)	4.333 (18)			6	5	13	19	39					
55	51	Removes and replaces inside soft trim.	88	3.898	3.633 (30)	4.000 (35)	4.105 (19)			3	6	21	25	33					
78	52	Repairs and replaces seat tracks and frames.	82	3.805	3.828 (29)	3.903 (31)	3.667 (18)			1	6	27	22	26					
45	53	Replaces damaged frame components.	82	3.768	3.621 (29)	3.871 (31)	3.778 (18)			3	8	21	23	27					
81	54	Services battery safely.	82	3.671	3.552 (29)	3.710 (31)	3.889 (18)			7	11	18	12	34					
48	55	Locates and identifies suspension damage.	88	3.648	3.167 (30)	3.714 (35)	4.211 (19)			6	7	25	24	26					
60	55	Aims headlights.	88	3.648	3.667 (30)	3.857 (35)	3.105 (19)			6	14	17	19	32					
79	57	Removes and replaces gas tank and checks lines for leaks.	82	3.646	3.448 (29)	3.839 (31)	3.611 (18)			5	12	18	19	28					
56	58	Estimates collision repair costs.	88	3.625	3.267 (30)	3.486 (35)	4.263 (19)			10	8	22	13	35					
21	59	Welds heavy gauge metal with the arc welding process.	82	3.451	3.207 (29)	3.710 (31)	3.278 (18)			5	12	27	17	21					
52	60	Replaces air conditioning components.	88	3.386	3.500 (30)	3.314 (35)	3.105 (19)			10	13	22	19	24					
71	61	Writes repair orders.	82	3.280	2.759 (29)	3.258 (31)	3.944 (18)			11	15	20	12	24					
77	62	Checks and repairs electrical circuits.	82	3.268	3.000 (29)	3.548 (31)	3.333 (18)			8	13	24	23	14					
76	63	Diagnoses and replaces steering column and steering components.	82	3.159	2.828 (29)	3.258 (31)	3.444 (18)			9	20	20	15	18					
46	64	Aligns rear end suspension parts.	88	3.148	2.800 (30)	3.200 (35)	3.474 (19)			12	16	26	15	19					
25	65	Fills with body solder.	82	3.085	2.759 (29)	3.097 (31)	3.444 (18)			7	21	28	10	16					
47	66	Aligns front end suspension parts.	88	3.068	2.600 (30)	3.200 (35)	3.421 (19)			15	22	12	20	19					
58	66	Repairs vinyl components.	88	3.068	2.833 (30)	3.171 (35)	3.158 (19)			11	21	22	19	15					
23	68	Welds metals with the gas-metal arc (MIG) process.	80	3.037	2.679 (28)	3.233 (30)	2.944 (18)			14	15	18	20	13					
54	69	Repairs and replaces transmission cooling lines.	88	3.011	2.667 (30)	3.114 (35)	3.158 (19)			17	14	26	13	18					
50	70	Repairs or replaces and tests cooling system components.	88	2.977	2.833 (30)	3.000 (35)	3.000 (19)			14	15	33	11	15					
53	71	Recharges air conditioning system with freon.	88	2.693	2.467 (30)	2.657 (35)	2.737 (19)			25	16	23	9	15					

APPENDIX C

EQUIPMENT LIST FOR AUTOMOTIVE BODY REPAIR

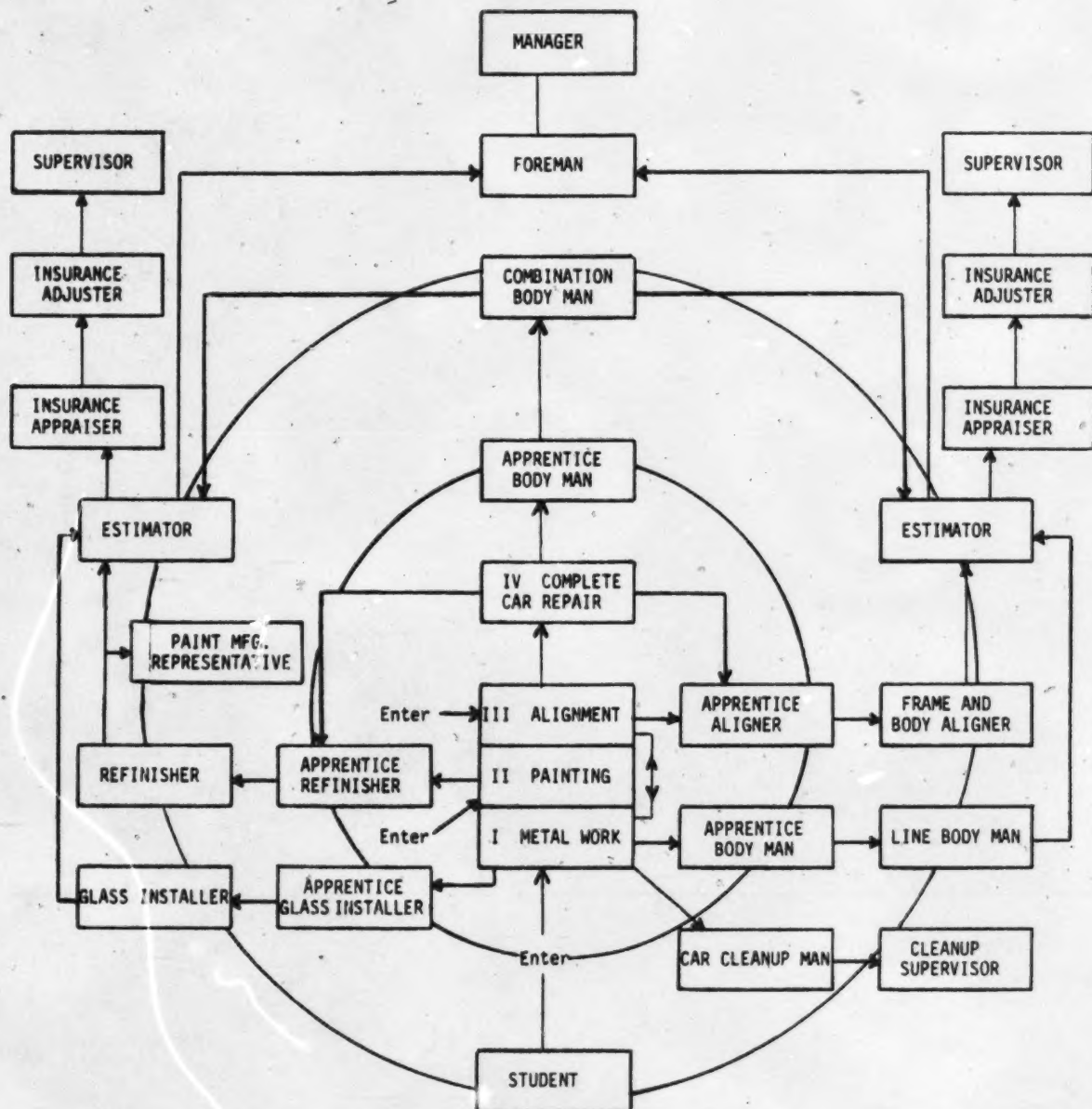
This is a basic list of equipment needed in the automotive body repair shop. The institution will need to determine the quantity of each item based on the number of students per class.

- Spray painting booth
- Air compressor
- Air system dryer
- Air transformers
- Air hoses and quick couplers
- Paint spray guns
- Spray gun agitator cups
- Paint spray respirators
- Air brushes
- Paint shaker
- Paint storage cabinets
- Infrared drying equipment
- Portable masker
- Paint striper roller kit
- Buffer and polisher
- Drills - various sizes and types. Electric and air operated
- Portable sandblaster
- Paint film thickness gauge
- Electronic air cleaners
- Safety glass cabinet and glasses
- Impact wrench - various sizes
- 1/2" drive torque wrench - various sizes and capacities
- Body disc sanders
- Sanders - various types and sizes
- Disc trimmer
- Heat gun
- Vinyl repair equipment
- Slide hammer dent puller set
- Storage cabinets
- Storage bins and shelving
- Shop desk
- Frame rack and body pulling attachments
- Suspension alignment equipment
- Portable body pulling equipment
- Body clamps and chains
- Electric winch
- Work benches
- Welding tables
- Oxyacetylene welding and cutting equipment and carts
- Electric arc welding equipment
- TIG welding equipment
- MIG welding equipment
- Electric resistance spot welder
- Hydraulic body jack sets - 4- and 10-ton capacity
- Safety stands
- Vacuum cleaner and accessories
- Body hammer sets

Body dolly sets
Body files and holders
Body spoons
Body pick tool set
Panel cutters
Heavy duty sabre saw
Mechanics tool sets
Crawlers
Vises - machinist
Tap and die sets - standard and metric
Door hinge and striker adjusting wrenches
Interior trim tools
Exterior molding tools
Door and window handle tools
Windshield tools
Staple gun
Rivet gun
Hole saw set
Drill index and drill bits
Extension cords
Extension lights
Ear plug dispenser
Plastic welding equipment
Time clock
Step stools - 2' and 3'
Portable floor crane
Printing-type calculators

Job Career Ladder

THIS JOB CAREER LADDER SHOWS HOW VARIOUS JOBS IN THE AUTOMOTIVE REPAIR INDUSTRY RELATE TO EACH OTHER AND SUGGESTS EDUCATION, TRAINING AND EXPERIENCE ROUTES A PERSON MIGHT FOLLOW TO REACH A DETERMINED GOAL.



INNER CIRCLE ONE YEAR OR LESS OF TRAINING. OUTER CIRCLE TWO YEARS OF TRAINING PLUS EXPERIENCE.